..., SEPTEMBER 3, 1936

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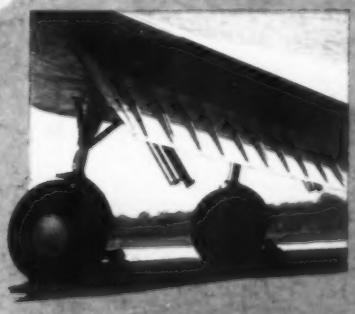

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY.	GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2.	260, DEANSGATE, MANCHESTER, 3.	26B, RENFIELD ST., GLASGOW C.2.
Telegrams: Autocar, Coventry. Telephone: Coventry 5210.	Telegrams: Autopress, Birmingham. Telephone: Midland 2971.	Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.	Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

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Other Countries: Year, £1 13 0. 6 months, 17s. 6d. 3 months, 8s. 9d.

No. 1445. Vol. XXX. SEPTEMBER 3, 1938. Thursdays, Price 6d.

Three Years Hence

BRITISH aviation, and more specifically British commercial aviation, is just about to enter upon one of the most interesting periods of its existence. The first of the Short Empire flying boats, *Canopus*, is having its upholstery installed, and the second boat will probably make its first test flights this week, afterwards going on to Felixstowe for official tests. The Armstrong-Whitworth four-engined monoplanes are being built at Coventry and Hamble, and work on them, although less far advanced, is now progressing rapidly. At Hatfield the two D.H.91 monoplanes, each to have four new De Havilland engines, are well on the way, and, finally, the Short-Mayo "Composite" upper and lower components are beginning to take shape at Rochester, side by side with the Empire boats.

There is no reason to doubt that some of the types mentioned will "conquer" the Atlantic, and that the old and the new worlds will be linked by air with something more than mere stunt flights without payload. Much will, however, still remain to be done in the way of experiment before regular passenger services can definitely be said to be practical politics.

It is important to remember that the new machines were *designed* something like two or three years ago. Quite a lot of progress in aeronautical engineering has been made during that period, and not by any means all of this could possibly be incorporated in the new types. Details had to be settled fairly early in the design stage, and once production was begun no drastic changes could be made without upsetting the whole policy. When these various machines were designed they represented the "last word" in their respective classes, but by the time they are operating on the routes the designers will have learnt to do still greater things.

Bearing in mind that great strides are being made in all the aircraft-manufacturing countries, Great Britain cannot afford to sit back and be content with what has already been achieved. In three years' time something even better will be needed, and the time to start thinking about that something better is now. Designers are prepared to do their share, and it is entirely a matter of £ s. d. whether the successors to the present new types materialise or not.

Because it offers the greatest obstacles, but also the greatest rewards, the Transatlantic problem is the one on which the concentration of effort may be expected to be mainly directed. So far, the flying boat type of aircraft is favoured, and there is a great deal to be said for it. Large size, equally desirable for seaworthiness and passenger comfort, is held by many to be more easily attained in a flying boat than in a landplane. Igor Sikorsky has expressed the opinion that the 140-ton flying boat is feasible, basing his view on calculations which show that only the weight of the wings increases proportionately with size, while parasite drag decreases. His argument in favour of the flying boat includes the reasoning that if, on arrival at the other side of the Atlantic, fog is widespread, a flying boat can sit down almost anywhere in fairly sheltered water, when the landplane would have to be guided by wireless to some airport which was free of fog.

Super Efficiency

On the other hand, there are a number of experienced designers who believe that super efficiency will be needed if a commercially attractive payload is to be carried, and that this is more likely to be attained with a landplane type. Be that as it may, recent technical progress has been such that experienced British designers are talking quite seriously of aircraft with sufficient range to operate between Europe and America at cruising speeds in the 300 m.p.h. neighbourhood and carrying payloads of two to three pounds per horsepower. These figures, which are based entirely upon present knowledge, and do not depend on possible future discoveries, nor on the introduction of stratosphere fly-

ing, seem startling now, but quite probably if they are attained in a few years' time, many will exclaim, "Is that the best you can do?"

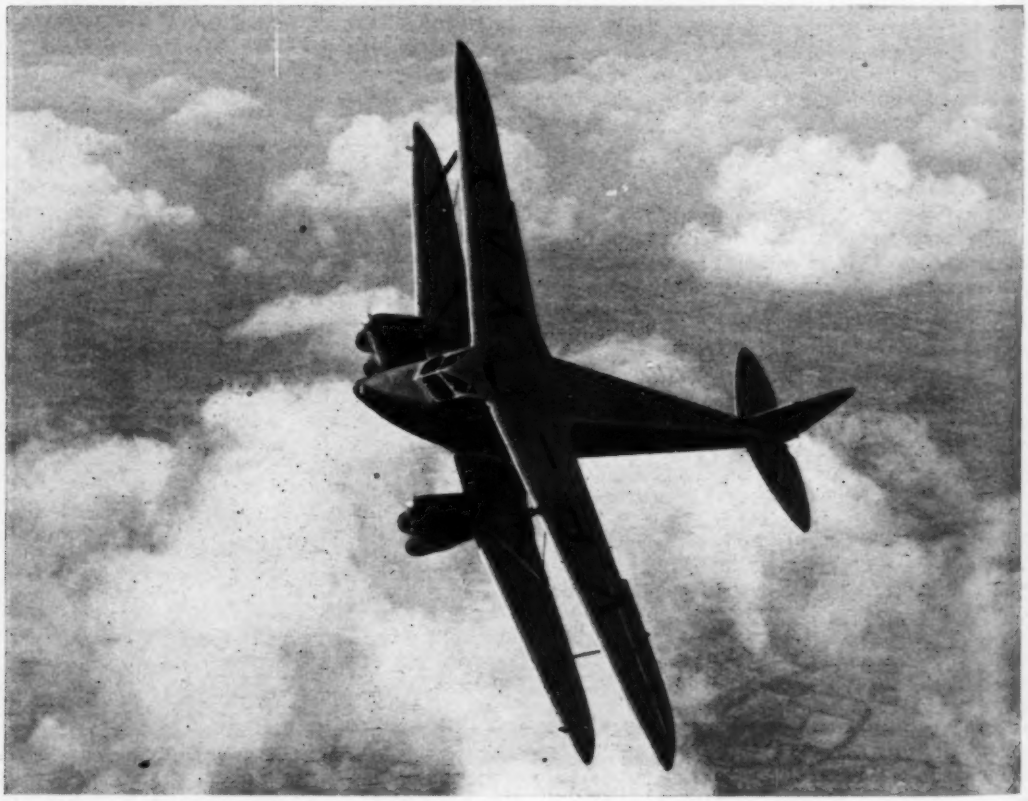
Very high wing loadings will have to be used if such long ranges are to be flown economically at high speed. Fortunately, the introduction of flaps and/or slots has made such loadings practicable. Engine reliability is now such that it is legitimate to design for the take-off only, relying upon the lightening of the aircraft at the end of the flight, through consumption of fuel, to give a reasonably low landing speed.

Take-off Power

The use of variable-pitch airscrews will help materially in getting the heavily loaded machines off, but even with these a limit is soon reached. Fortunately, it seems that a considerable degree of excess power may be made available from the engines for take-off purposes for limited periods. Some tests made recently in America indicated that an engine supercharged to give its full power at 15,000ft. may, by the very simple expedient of retarding the ignition, be used for a take-off power of about 40 per cent. in excess of its power at the critical altitude without reaching excessive temperatures and without burning out its exhaust valves. Still greater thrust may in time be made available by a two-speed airscrew gear to give full benefit from the extra engine power available for the take-off.

On the aerodynamic side the designer will need to use every artifice he can think of. Retractable undercarriages can be taken for granted in the super-efficient machines; other and less obvious aids to efficiency will follow. For example, full use will have to be made of the low-drag engine cooling which research has shown to be possible, and, as this includes some form of controllable cooling, this question links up closely with that of extra take-off power. As machine size goes up, the engines can be buried to an increasing extent inside the wings, and a certain amount of drag saved in that way, even without counting on the smaller-diameter radials which may be expected during the period contemplated. Boundary-layer control is rather far off at present, perhaps, but much work is being done abroad and at home, and the assistance to be expected from this source should not be left out of the reckoning.

All these things cost money, a great deal of money, and if the necessary support is not forthcoming these machines will not be realised. Although the subject has been considered here mainly from the civil point of view, it is obvious that the military aspect enters very seriously into the picture. The difference between the commercial aeroplane and the bomber is not very great. Already there have been several cases of the former being converted into the latter type, and now Imperial Airways are converting the Armstrong-Whitworth troop carrier into a commercial machine. The common aim of research benefits both classes, as stressed by Government spokesmen on several occasions. There is everything to be said for Government assistance in developing the super-aircraft of 1940.



LIMOUSINE TAXI: A pleasing camera study of the De Havilland Dragonfly lately supplied to Rhodesia and Nyassaland Airways. This model has proved so popular as to encourage the construction of a larger machine—the Dolphin—of similar layout with a pair of the new Series II Gipsy Six engines. (*Flight* photograph.)

The Outlook

A Running Commentary on Air Topics

Artillery for Martlesham

BRITISH manufacturers, notably Bristols and Shorts, have made big contributions in the past to the development of French aeronautics. Now France is able to reciprocate to our advantage. The acquisition by the Air Ministry of a Dewoitine D.510 single-seater fighter with 860 h.p. Hispano-Suiza Ycrs "cannon engine" (so called because a 20 mm. shell-firing gun is mounted between the cylinder banks, whence it fires out through the airscrew hub) is presumably in pursuance of the policy to purchase from time to time representative examples of foreign military aircraft, but, interesting as the Dewoitine is from a structural viewpoint, the "cannon" undoubtedly provides the major attraction.

Whereas in this country the practical value of the "cannon" for aerial fighting is still questioned in many quarters, and multi-machine guns are receiving official favour, France regards the weapon as standard armament, and batches of *avions canons* are being issued to squadrons. Opinion is divided on the Continent over the question of the relative merits of a machine with a "cannon engine" and one carrying a pair of "cannons" in the wings. The latter is what is known as a *pluricanon* type. Obviously, there is a great deal to be said for such a machine, for it mitigates to a great extent one of the major drawbacks of the "cannon" for aerial fighting, which is a comparatively slow rate of fire. Protagonists of the "cannon" engine maintain that outboard "cannons" affect the structure adversely, and that as their shells leave the muzzle they are liable to bend the airscrew tips. Supporters of the *pluricanon* insist that these difficulties have been overcome. Certainly, their suppression does not seem a superhuman task.

The alleged influence of vibration and heat from the gun is frequently presented as an argument against the *moteur-canon*. Martlesham will assess the merits and drawbacks of the weapon impartially, and will doubtless discover if the rate of fire (400 rounds a minute) claimed for it is attainable and if a single shell will rip off 20 sq. ft. of covering and smash a structure to the extent quoted.

The R.A.F. in Egypt

WHILE the proposal to establish a base for the R.A.F. in Cyprus reflects the increased importance which recent events have conferred on the eastern Mediterranean, the terms of the Anglo-Egyptian treaty draw attention more particularly to the new situation brought about by the Italian occupation of Abyssinia. The British forces, Army and R.A.F., are to be concentrated round the Canal zone, which is mainly a concession to Egyptian sentiment. The treaty permits the R.A.F. in normal times to have an establishment of not more than four hundred pilots, though in times of emergency a temporary increase is to be allowed. It is interesting to examine this figure.

The present strength of the R.A.F. in Egypt is five squadrons and a Flying Training School. The pilot strength of these units, as given in the August issue of the *Air Force List*, is as follows:—No. 6 (Bomber) Squadron, 19; No. 45 (Bomber) Squadron, 29; No. 208 (Army Co-operation) Squadron, 17; No. 216 (Bomber Transport) Squadron, 23; and No. 4 F.T.S., 29. Perhaps it is legitimate to add No. 47 (B) Squadron at Khartoum which has 22 pilots. That makes a total of 139 pilots. Of these units, one flight of No. 6 B.S. is normally stationed at Ramleh in Palestine, and at present the whole squadron has been sent there to help to deal with the Arab riots. The military forces have first claim on the services of the Army co-operation squadron, though on occasions it would be available for Air Force work proper and could take part in bombing operations. The legitimate work of No. 216 B.T.S. is transport, chiefly conveyance of troops, but it, too, if not required by the Army, could also undertake heavy bombing. In a sudden emergency which called for both Army and Air Force operations, the R.A.F. in Egypt could only count on the services of one bomber squadron and two flights of another. Obviously this force must be increased. The agreed limit of four hundred pilots will permit of the strength being more than doubled.

And Fighters?

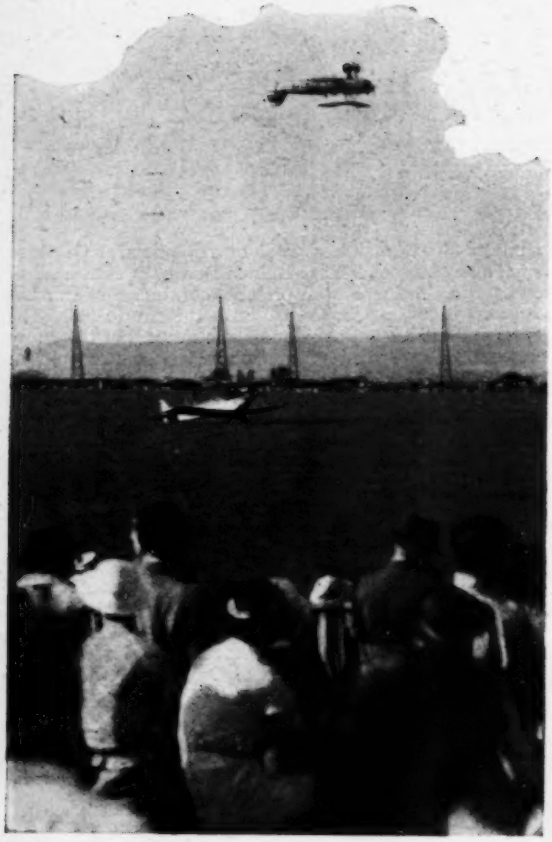
LIKE other Overseas Commands, the Middle East possesses no fighter squadrons. Fighters are only for defence against enemy aircraft, and hitherto no countries bordering on any of our Overseas Commands have established air forces which could conceivably have threatened any part of the British Empire or any British interest. The Italian occupation of Abyssinia has quite changed the situation in northern Africa. Certainly the Italian possession of Libya has lain on Egypt's western border since its conquest by Italy some twenty-five years ago, but until Italy violated her undertakings to the League by invading Abyssinia, the existence of Libya never seemed a reason for stationing fighter squadrons in Egypt. It has not yet been decided that fighter squadrons are to form part of the increased air garrison on the Canal, but it will be very surprising if some are not stationed there. In fact, an omission to take such an obvious precaution would be a reckless gambling with the security of one of the most important trade routes of the British Empire.

Fourteen for Jo'burg

FOURTEEN entries for the London-Johannesburg Race cannot really be said to be a magnificent response for an invitation to race for an amount of prizes totalling £10,000. Doubtless the relatively small number is due to the short time available between the announcement of the race and the date of the start. This left no time for constructors to build new types for the race, and so we find only standard aeroplanes entered, or at any rate standard machines with but minor modifications and with refinements such as variable-pitch airscrews.

It is always dangerous to prophesy, but in this case it looks as if the Percival Mew Gulls should stand a very good chance in the speed race. Their only serious competitor appears to be the Airspeed Envoy with Siddeley Cheetah engines, and possibly the new Miles Peregrine may also exceed the 200 m.p.h. mark. Range will count heavily, and a slightly slower aeroplane may make up a good many m.p.h. by saving two or three refuellings on the way down through Africa.

The formula used for calculating handicaps is the same as that used in the England-Australia Race, with very minor numerical modifications. In spite of these, the formula still seems to tend to under-estimate speeds, but for relative as distinct from absolute speeds this may prove of no great importance.



THE LYMPNE INT

WITHOUT casting any aspersions whatsoever on the R.Ae.C.'s Week-end Aerien, which was organised on the somewhat dignified lines which its sponsorship demanded, it can safely be said that the Cinque Ports Flying Club's Fourth International Air Rally at Lympne last week-end was everything that such an affair should be. Moreover, both days were blessed with weather of the kind that has been all too rare this weeping summer.

Thirty-six Continental visitors arrived by air, while a number of others made the short steamer crossing *via* Folkestone; British private owners rolled up in scores; the American pilot, Mr. Jimmy Haizlip, in a Cessna C.34 entered by Surrey Flying Services, added to the gaiety of nations by walking off with the Wakefield Trophy; and the great British Public, bless it, rolled up in its thousands.

Nor were distinguished visitors lacking; Lord Willingdon, who is Lord Warden of the Cinque Ports and the Club's new president, was there with Lady Willingdon, and their son and daughter-in-law, Viscount and Viscountess Ratendone; Lord Hugh Cecil attended; Sir Philip Sassoon came in his new D.H. Dragonfly; and Mr. Noel Coward, a vice-president of the Club, was among those who offered hospitality to the guests.

Saturday's Happenings

The proceedings opened with the time-honoured arrival competition. An erudite maroon having "determined the time" (*vide* programme), the Continental and British winners were found to be, respectively, M. Pessemier, Belgian owner of a Stinson, and Mr. L. D. Desoutter (Puss Moth).

Then, thus early, came the first instalment of the real business of the day, the Cinque Ports Wakefield Cup Race. The course was a really sensible one—a triangular 18-mile affair which, had there not been a heat haze, would have kept the machines in view all the way round. An extra S-turn across the aerodrome added to the fun. Lastly, only three laps were flown in each of the two heats and the morrow's final, so it was delightfully easy to keep track of everybody; the aeroplanes "hurtled past" (one believes that is the approved term) at frequent intervals and negligible altitude, and, altogether, people saw the sort of spectacle the King's Cup Race ought to provide but never does.

Not unduly to prolong the story (the progress of the race is told in tabular form on p. 246), it may be said that the T.K.2, entered by Sqn. Ldr. O. W. Clapp, of the D.H. Technical School, and flown by Mr. R. J. Waight, won at 171.5 m.p.h., having handsomely gobbled up a matter of 10 min. 2 sec., which separated it from the second machine home, Mr. A. du Port's Moth Major, Miss Clingan up. The fuel system of Mr. William Courtenay's Swallow having developed what might have been fittingly described as a deadlock, there were only six competitors in the heat, so all became eligible for the final.

Next came the inevitable setpiece, with its accompaniment of squibs and yelling "natives." Having ackowledged the industry of those enthusiasts who painstakingly create "armoured cars" out of wood and canvas, one must be further charitable and say that these turns certainly go down with the children. Actually, this one was lifted out of the mediocre by a converging bombing attack by three of the Club's Moths—a flour-bag offensive so dashingly conducted and well-timed as to remind one of the Bulldogs of bygone Hendon Displays.

There followed half a dozen demonstrations—Mr. Piper with the handsome and impressive Scion Senior (four Pobjoy Niagara IIIs), Mr. Field-Richards in the Taylor Cub, Mr. Kronfeld in the Drone, and those irrepressible *Pou* im-

presarios, Messieurs Mignet and Appleby, the former in the agile 100 m.p.h. H.M.18. Mr. Appleby, by the way, now takes his veteran Carden-engined machine across country as a matter of course. We will refrain from telling the tale of a head wind and how Mrs. Appleby put up a gallant seventy-mile race in the family barouche.

And so to the chief public attraction in the programme, the inimitable Gauntlet flight from No. 19 Squadron, with Flt. Lt. Broadhurst providing an R/T. commentary. We have described their elastobatic show more than once in *Flight*, but that does not one whit lessen our enjoyment in watching it—though we are developing a malicious and secret longing to see those rubber cords broken *just once*. Failing this, perhaps the Air Ministry can be persuaded to give F/O. MacLachlan and P/O. Morris transmitters as well, so that we can enjoy hearing tripartite conversations.

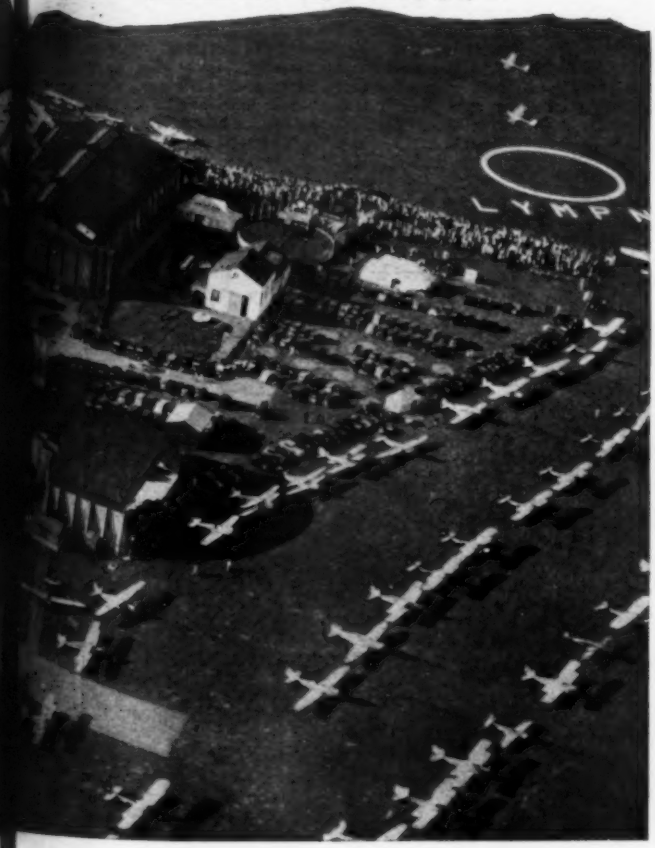
"Magnifiques!" and "Wunderbars!" echoed loudly from the Gallic and Teutonic ranks, though M. Guy Hansez did tell us, in the nicest possible way, that he had seen a very similar act by Belgian Air Force Fireflies at Evère quite a long time ago.

Possibly following the precepts of its distinguished vice-president, the Club obviously remembered that contrast is a *sine qua non* of entertainment, for the next item was Heat 2 of the Race. Again referring the reader to the tabuloid tale

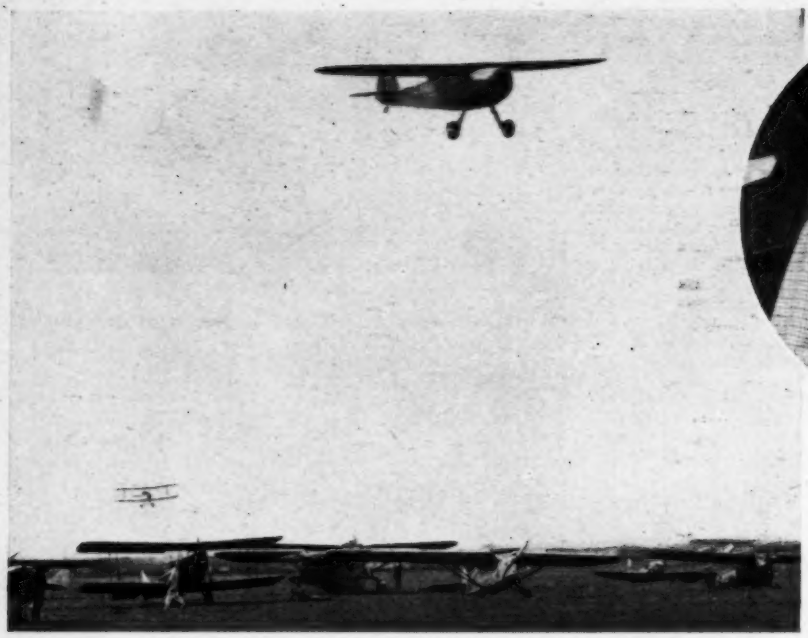
E INTERNATIONAL

Cinque Ports Club Entertains Pilots from Six Continental Countries — and an American Wins the Wakefield Trophy Race!

(Illustrated with "Flight" Photographs)



(Top, left) Herr Paul Förster in action with his Focke-Wulf Stieglitz. (Centre) Looking down on Lympne: there was another packed enclosure on the north side of the aerodrome. (Above) Mr. K. K. Brown, chief instructor of the Cinque Ports Club, flies Mr. Ken Waller's 1912 Caudron, while M. Guy Hansez provides a contrast with its 1935–1936 descendant, the Simoun. (Below) Lord Willingdon (Lord Warden of the Cinque Ports), who has accepted the Club's presidency, with Lady Willingdon and Mrs. W. E. Davis, who, as hostess, was largely responsible for the success of the social—and sociable—side of the week-end.



The Cessna winning the Wakefield Trophy by a narrow margin from Miss Klingan, in Mr. du Port's Moth Major, which can be seen low down on the left. (Above) Mr. Jimmy Haizlip, pilot of the Cessna, looks pleased about it.

on p. 246, it remains to be said that among eight starters Pilot Jimmy Haizlip, in his four-place commuting ship, "walked it" from the 10 min. 40 sec. mark at 141.25 m.p.h. average. M. Hansez, starting scratch 5 min. 11 sec. later in the Caudron Simoun, had to be content with fourth place, averaging 171½ m.p.h.—oddly enough, a speed identical with that of Waight in Heat 1.

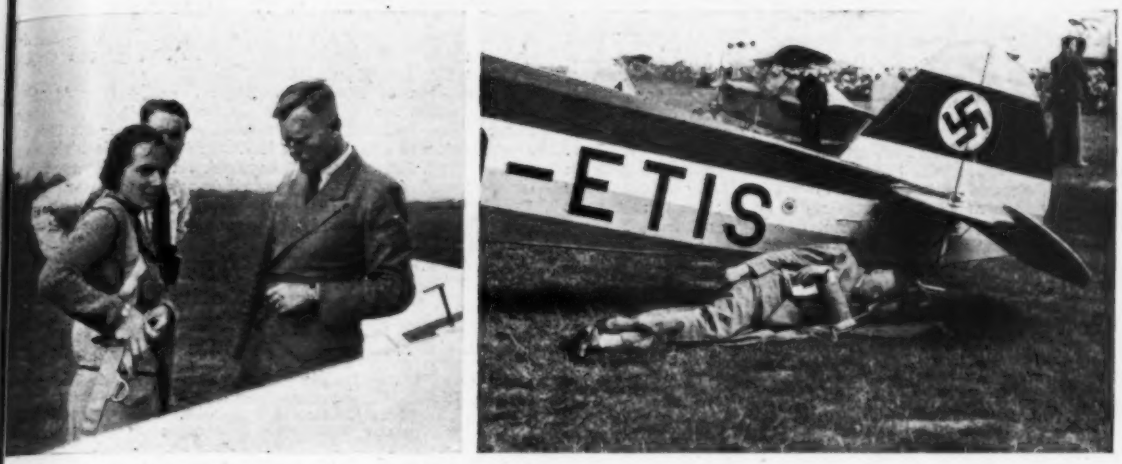
The Simoun, incidentally, had flown some 280 hours virtually without attention, and odd corners still harbour the sand of the Sahara, on which pleasant pasture M. Hansez was marooned for three days last April. The engine is the 220 h.p. six-cylinder Renault with V.P. airscrew, and the machine fairly bristles—mainly internally, fortunately—with shrewd contrivances, such as breakaway parachute exits for the four seats, a fusible-plug fire warning system, an ice prognosticator, and an instrument drive venturi placed behind the stub exhaust pipes to discourage refrigeration.

At last year's Rally, Herr Paul Förster, of Dortmund, put up an aerobatic show which has since become a sort of local legend which the young Lympne pupils learn at their instructor's knee. On Saturday he was here again, with his Focke-Wulf Stieglitz two-seater (150 h.p. Siemens) and a still finer repertoire.

His display is so original that it rather defies description, and even Commentator Davis at times found himself at loss to adapt old aerobatic patter to new and unheard-of stunts. Definitely, however, the *leitmotif* of Herr Förster's display is the bunt, in a variety of forms ranging from the orthodox outside loop to vertical outside turns; these last looked so "impossible" that at least one awestruck spectator forswore the Club bar for the remainder of the day. *Inter alia*, Herr Förster performed a tight circuit of perfect rolls and concluded with an upward roll from the ground and a sort of inverted stall turn at the top, coming out in an inverted dive and then bunting the right way up. Throughout, his placing and direction were perfect. Most remarkable of all, Herr Förster has flown only 200 hours, and taught himself aerobatics.

Light relief followed, Chief Instructor K. K. Brown and Assistant Instructor L. H. T. Cliff putting on a grand instructor and pupil act, the latter finally bouncing his Moth on to the ground in a way that must have shaken the Club's G.E.

(Left) Where the Pou pinches: M. Mignet apologises to one of the officials, Mr. C. A. Wilson, for a certain difficulty of egress from the H.M.18. (Right) Lady Willingdon presenting the Yates Speed Trophy to M. Guy Hansez, while Lord Willingdon and Mr. Noel Coward (Vice-president) look on.



(Left) Fräulein Ilse Fastenrath and Herr Paul Förster, the German aerobatic experts. In the background is Mr. E. Forsyth, a Club member who acted as liaison officer to the German guests. (Right) Herr Förster steals forty winks under the protection of the Swastika.

Contrast again, this time by Mr. Ken Waller in the 1912 Caudron, and then a towed gliding demonstration by the Channel Gliding Club to lead up to the final item, a parachute drop by Mr. Gywnne Johns, who was unlucky enough to damage a shoulder on touching down.

The foreign visitors and others then went along to a cocktail party at Mr. Noel Coward's indescribably lovely place nearby; but anybody who expected a respite from aeronautics was doomed to disappointment, for F/O. Roger Bushell arrived in a B.A. Swallow, put it down daintily between sheep and molehills in one of Mr. Coward's fields, and joined the party. It is, perhaps, unfortunate that there were also no fewer than three bulls in that field. The Swallow is (or was) painted red. . . .

F/O. Bushell's landing among the sheep had no bearing on the fact that four such animals were roasted whole for the barbecue dance at the Davis Home that night. A most cheery party this, thoroughly in keeping with the spirit of the week-end. They had even arranged for a full-size fair to be functioning across the way, where Mr. Handicapper Rowarth was to be seen wielding the try-your-strength sledge-hammer to such good effect, and ringing the gong so shatteringly each time, that two well-known racing pilots paled visibly.

The second day began quietly, as second days are apt to do, a certain pilot's heartfelt remark summing up the situation nicely—"Oh, I *do* hate the sound of an XYZ engine first thing in the morning."

At 2.30 p.m., however, the all-important final of the Wakefield Cup Race took place, eleven starters coming to the line. There being a moderate S.W. breeze, in contrast to Saturday's near-calm, that line was hidden in the depths of Lympne's famous dip, and the first glimpse most people obtained of the machines was when they did a 180 deg. turn off the ground to get on their course.

It was again too hazy to see the aircraft all the way round, but few had any doubts about the Cessna's chances. With most people flying very low, and with the home turning point (consisting of a Bentley which one trusts was adequately insured) in close proximity to the main enclosure, cornering styles seemed even more varied than usual. With the exception of Field-Richards' little Taylor Cub, Henshaw's Hornet was probably quickest on its course after the take-off. At

During the demonstrations: The Short Scion Senior over a section of the crowd.

the turn, Field-Richards was perhaps the lowest, flicking a saucy wing tip within a few feet of the Bentley each time round. Miss Klingan, after each turn, put the Club's Moth Major on to its course with incredible speed and dexterity. Waight took the T.K.2 round in one tight, clean sweep, and stuffed its nose down into the dip, going nearly out of sight. Mr. Seth-Smith wasted no sky in the De Luxe Monospar. The Cessna was not spectacular, but obviously travelling very fast.

Our table again tells the story. Actually, rough timing on each lap showed that the Simoun was unlikely to catch the T.K.2 (to which it was conceding 1 min. 1 sec.), and most certainly not the Cessna (2 min. 3 sec. 'vantage). Yet the finish was not such a walk-over as some people expected. Miss Klingan was crossing the boundary as Haizlip streaked over the line, and less than eight seconds after the winner the Taylor Cub came home. Yet another feather in the Dancy-Rowarth headgear.

The remainder of the programme was, to a certain extent, a repetition of Saturday's events for the public delectation.

Instructors Brown, Cliff and Morris formated quite in the Hendon style in Club machines, the first-named, as flight leader, spending most of his time upside down in the Tiger Moth. Then followed a spectacle which was most amusing to watch, but not nearly so funny if thought about seriously. The firmament suddenly became alive with demonstrative aeroplanes of the oddest variety. Counting them off on the Editorial fingers, we recollect that jumping gaily on and off the deck were Mr. Bries' C.30 Autogiro and the Avian with the Eugster three-wheel undercarriage; that Messrs. Kronfeld and Collins were flying their Drones hands-off at all altitudes from 0 to 300; that Messieurs Mignet and Appleby were staging a terrific flea circus in any spare piece of sky that they could find; and that the Scion Senior seemed to be chasing the whole lot round the aerodrome like a hen trying to round up her chickens.

Probably, of course, we are exaggerating terribly, and the whole thing was an hallucination due to the headiness of the Lympne air; but we do carry an indelible impression of a *Pou* going into a near-vertical turn to avoid something several times its own size approaching a high rate of knots from the opposite direction.

Grandfather and Grandson

The setpiece was again staged, and this time Mr. Seth-Smith brought the Monospar Ambulance on to the scene of carnage.

The rodeo having concluded, Mr. K. K. Brown flew Mr. Waller's 1912 Caudron (hands-off part of the time), while M. Hansez formated on him in the modern 200 m.p.h. product of the same factory. Throttled right back, and with flaps down the Simoun managed to keep station with the old pusher, which has (to quote Mr. W. E. Davis on the loud speakers) "a top speed of well-nigh 65 m.p.h."

Lady Willingdon then presented the prizes—dozens of them, from the Wakefield Trophy to the excellent medals with which those who had given demonstrations were rewarded.

As the penultimate item, there was an aerobatic display by the youthful Fräulein Ilsa Fastenrath in her Fiesler F.5 (80 h.p. Hirth four-in-line) In appearance this two-seater rather suggests a Miles Whitney Straight minus its cabin, and the amount of work which its 80 horses do is prodigious. Her display, rather on the lines of Herr Förster's, though less sensational, was a model of well-judged aerobatic work, particularly in regard to her stall turns and inverted dives.

Last of all, Mr. de Greeuw G.Q.'d it from the Ramsgate Airport Short Scion. By the kindness of Capt. Eckersley-Maslin, who was piloting the machine, we were able to observe the departure from the top end, so to speak. One always knew that the parachute fraternity had absolutely no nerves—but just what can one say about a man who salutes, grins broadly, and remarks "Cheerio, chaps!" as he disappears backwards off the undercarriage struts?

A reception of the visitors by Sir Philip Sassoon at his country house nearby, and an informal dance in the hangar, brought the week-end to a close. The Cinque Ports Club has every reason to congratulate itself. Perhaps it is invidious to name names, but one cannot overlook the fact that the success of the social side was undoubtedly very largely due to Mrs. "Bill" Davis, who, helpful to everybody, seemed to be on duty morning, noon and night without her cheeriness diminishing one whit.

The foreign guests who flew over were the following:

Germany.—Herr Paul Förster and Frau Förster (Focke-Wulf Stieglitz), Fräulein Ilse Fastenrath and Fräulein Girda Osterhage (Fiesler), Herr A. Troll (Gerner), Herr F. Poulet, Herr F. Bischoff.

France.—M. Linais, M. Houbart, Mme. Royer, M. and Mme. Filippe, M. Jonas, M. Orange, M. and Mme. Mignet, M. van Laer, M. Delemer.

Belgium.—M. Guy Hansez (Caudron Simoun), M. du Port and M. Gurniat (Bulte), M. and Mme. Rene de Caritat de Perruzis (Puss Moth), M. Lambeau (Stampe et Vertongen), M. Pessemier and three passengers (Stinson), M. Provost and passenger (Leopard Moth), Baron R. de Vinck de Winnezeele (Tipsy monoplane).

Holland.—Mr. H. E. Rynders.

Poland.—Herr van Ryl, Herr B. Skorzenski.

Austria.—Herr Otto Mendl, Herr Viktor Zeekel.

WAKEFIELD TROPHY FINAL.

Reg.	Machine.	Entrant.	Pilot.	Start.	Lap Order. 1	2	3	Speed.
				m. s.				m.p.h.
IK	Cub ...	A. J. Walter ...	F. Field-Richards	0 00	1	1	3	78.25
HF	Arrow .	T. A. Somerset Webb	E. T. Symmons	7 18	2	2	4	—
KP	Moth ...	T. Adam	Entrant	9 31	3	5	11	—
ZK	Moth ...	A. T. Stavely...	Entrant	10 53	5	4	7	—
HH	Moth ...	A. du Port	Miss Klingan ...	11 26	4	3	2	111.5
MJ	Hornet	—. Ogle	A. Henshaw ...	14 50	6	7	9	—
IG	Hobo .	Lord P. Crichton-Stuart	Entrant	15 24	7	9	8	—
DY	S.T.25 .	General Aircraft	K. G. Seth-Smith	15 36	8	6	5	—
09	Cessna	A. Macdonald...	J. Haizlip	17 38	9	8	1	145.0
NO	T.K.2...	O. W. Clapp ...	R. J. Waight..	21 28	10	10	6	170.0
SF	Simoun	G. Hansez	Entrant	22 49	11	11	10	175.5

Winner receives Wakefield Cup and £50, presented by Lord Wakefield.
Second receives silver medal and £25, presented by Mr. F. Sigrist.
Third receives bronze medal and £10, presented by Mr. A. du Port.
Fastest Actual Time: Yates Speed Trophy.

THE HEATS.

HEAT 1.

Reg.	Start.	Lap Order. 1	2	3	Speed.
	m s.				m.p.h.
IK	0 00	1	1	3	75.25
ZK	10 55	3	3	5	—
HH	11 26	2	2	2	108.0
MJ	14 50	4	4	4	—
HB*	16 29	5	5	6	—
NO	21 28	6	6	1	171.5

HEAT 2.

Reg.	Start.	Lap Order. 1	2	3	Speed.
	m s.				m.p.h.
VW†	0 00	3	7	8	—
HF	0 20	1	1	2	93.75
KP	2 33	2	2	6	—
IG	8 26	5	5	5	—
DY	3 38	4	3	3	128
AB§	10 02	7	6	7	—
09	10 49	6	4	1	141.25
SF	15 51	8	8	4	171.5

* A. Henderson (Leopard), non-starter in final.
† Baron de Vinck de Winnezeele (Tipsy monoplane), did not quality for final.
§ Mrs. MacDonald (Hawk Major), did not quality for final.

Antiques to Order

EVERYONE in the world of motoring sport knows of that Brooklands concern with the resounding title of The International Horseless Carriage Corporation. Last year Mr. R. G. J. Nash, the moving spirit, started adding early aircraft to the most impressive collection of antique road vehicles which he has for hire and for sale. He has now produced a booklet giving details of the corporation's stock, and the list or original and reconstructed aeroplanes is as follows:—

1903 Wright Glider.	1908 Wright.
1909 Bleriot Type XI.	1909 Henri Farman.
1910 Duperdussin.	1910 Antoinette.
1912 Blackburn.	1913 Maurice Farman.
1916 Fokker Monoplane.	1917 Fokker Triplane.
1917 Sopwith Camel.	1918 Fokker D VII.

In some cases the original engine types are used; in others there are engines very nearly approaching the original.

Certain of these machines are held ready for hiring for displays and similar purposes, while others can be prepared if due notice is given. Pilots and transport can be arranged. Full details are obtainable from The International Horseless Carriage Corporation, Brooklands Track, Weybridge, Surrey.

Piston Service

THE C.M.D. Engineering Co., Ltd., announce the opening of a new depot at 283, Deansgate, Manchester, 3, for the convenience of Northern wholesalers and dealers. Factory stocks of Covmo cylinder liners, pistons and piston rings will be carried at this depot, and a full works-trained technical staff will be in attendance

Apart from the company's factory at Warwick, depots are in existence in London, Bristol, Belfast, Leeds and Glasgow.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

PRODUCTION should start at the projected Austin aircraft factory next July. The work of preparation will continue henceforth by day and night.

The ex-King of Siam made his first solo flight at Heston last Friday.

Mr. Howard Hughes may enter a special Cyclone-powered Douglas DC-2 for the Bendix Trophy Race.

According to M. Louis Breguet, who has been to Russia with a French mission, a plant at Nijni Novgorod is building five fighters daily.

Ninety-seven *Poux* have been registered in this country, and sixty-nine owners have obtained permits to fly them.

More than 300,000 people attended "Aviation Day" at Moscow and witnessed the simultaneous descent of 600 parachutists.

The French Air Ministry is organising a race from New York to Paris, to be held on May 21 next year, the tenth anniversary of Colonel Lindbergh's solo crossing.

The Bristol machine designed for high-altitude flying is being tested by Mr. Cyril Uwins. At the moment it has a Pegasus engine, but not the special model for which it was designed.

Thirteen Gloster Gladiator fighters with 840 h.p. Bristol Mercury engines have been ordered by the Latvian Government. They will be delivered within a year.

M. Robert Robineau, who has collaborated with M. Henri Mignet in the development of the *Pou du Ciel*, was badly injured when his *Pou* dived from 180 ft. after taking off at Soissons on Monday.

F/O. C. F. Hughesden, who came second in the London-Isle of Man Race last May, will be co-pilot with Mr. David Llewellyn in a Vega Gull entered for the Schlesinger Race.

CURRENT INTEREST: The British Gliding Association's International Gliding Competition opened last Saturday at the headquarters of the Derbyshire and Lancashire Gliding Club at Camp Hill, Gt. Hucklow, Derbyshire. Mr. D. Hiscox, chairman of the London Gliding Club, is seen demonstrating controls.

Arrangements have been completed between the Air Ministry and the Standard Motor Co., Ltd., for the construction of a £650,000 plant at Coventry for the manufacture of aero-engine parts. It will interfere in no way with the production of Standard cars.

Mr. Samuel Reid, an Edinburgh motor agent, flying over his native Orkney Islands, noticed a sheep in distress on a cliff face at Mull Head, Deerness. Knowing the farm to which it belonged, he flew over it and dropped a note which led to a rescue.

Miss Amelia Earhart hopes to make an extensive study of "human reactions" to flying. She plans to conduct a clinical survey of the effects upon individuals of speed, altitude, fatigue, pressure, mechanical aids, and various other factors. Her machine is a special Lockheed Electra with tankage for 4,500 miles.

Dr. Dalton, of the Benoni Flying Club, South Africa, died while flying two passengers over the Rand last Sunday. One had a few hours' flying experience, and, with the assistance of the young lady with him, managed to drag the body from the controls as the machine lurched and twisted about the sky and to bring the machine down with only a mild crash.

PUSHING THE BOAT OUT: Mr. Hore-Belisha launched a new cruiser last week at Devonport, after arriving in a B.A. Swallow from Wilmington *via* an unrestricted area. The Swallow must have inspired a particular feeling of confidence, because it can be throttled back safely to round about the desired 30 m.p.h. Mr. Hore-Belisha intends to learn to fly himself.

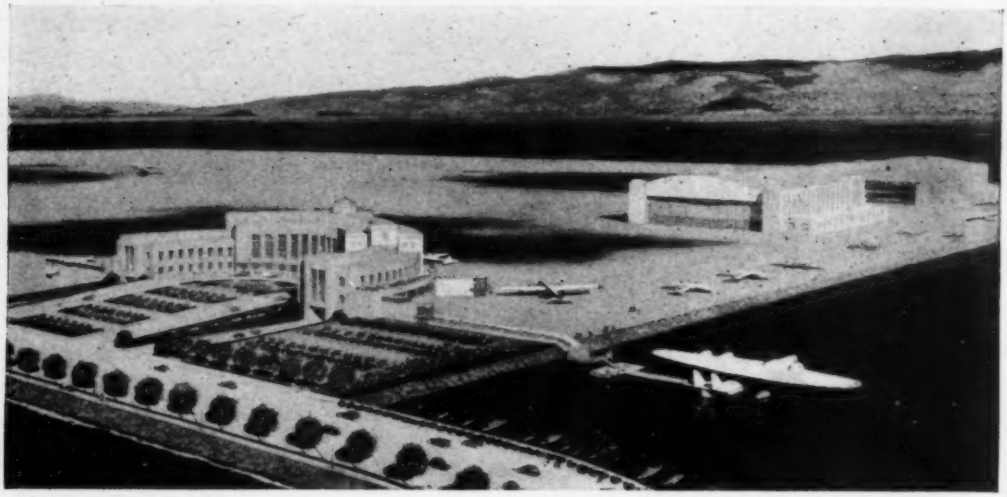
Twenty-five Years Ago

(From "Flight" of September 2, 1911.)

"'Claudie' Grahame-White and Tommy Sopwith are doing a great deal over Boston way to show the Candy Kids that 'they've got to go some' to beat us on skill in piloting. On the first day of the meet G.-W. got away with both the speed and the altitude prizes, and that on a machine that he'd never flown before—a 70 h.p. Nieuport, while T.O.M. captured the quick starting award and ran second in the bomb-dropping"

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



FOUR YEARS DISTANT: San Francisco's great new municipal airport, to be opened in 1940 at Yerba Buena Shoals, in San Francisco Bay, is shown in this drawing of the project. The 430-acre site of the Golden Gate International Exposition, now under reclamation by the United States Army Engineers Corps, will be the location of this impressive layout. The view is from Bay Bridge, looking north-east.

THE WEEK AT CROYDON

Good Wishes to "Wilkie" : Fanning the Fevered Brow : A Diviner on Top of his Job : All Handsome Pilots are Slightly Sunburnt : Why Does a Door Stop?

LAST Saturday Capt. Cumming, of Imperials, left by air for the Mediterranean, where he will replace Capt. Wilcockson, hurt in the *Scipio* accident. On the same machine was Mrs. Wilcockson, who carried to her husband messages both of sympathy and of congratulation from many staunch friends at Croydon. "Wilkie," one of the senior pilots of Imperials, is a popular figure at Croydon among his brother-pilots of all companies and nationalities. I wish him a speedy recovery and a quick return to Croydon. There are few finer pilots than "Wilkie" on the air routes, and many of us remember him as one of the pioneers of blind flying and of getting up above the clouds in days when the average airline pilot still flew by Bradshaw.

Incidentally, it is men of this sort who are being failed on some trick question in the Navigation Examinations set by wizard theorists whom it would be interesting indeed to see piloting *Heracles* from Croydon to the coast in a spot of dirty weather. By the way, there is a story that one question in an exam. of this sort some time back was. "What special meteorological conditions would be encountered at Pretoria?" or words to that effect. A pilot, most of whose early flying had been done in those parts, racked his brains for something equivalent to the weird wind currents around Gibraltar. What do you think the answer was? Why, "thunderstorms"!

I am told that *Canopus*, the eagerly awaited Empire boat, is almost ready for service, being, indeed, in the hands of Mr. Rumbold, the well-known aeroplane interior decorator and chair specialist, who is putting the finishing touches on what is probably the most luxurious aeroplane interior in existence to-day, America notwithstanding.

Mr. J. K. Morton, chief technical officer of British Continental Airways, has been elected to the Technical Commission of I.A.T.A. Whether he is the first and only bearded member of that august fraternity I do not know, but the fashion may spread. After all, it's mostly talking, and there is an ancient adage, "It's merry in hall when beards wag all."

An engineering journal has discovered that air traffic companies use the punkah louvre system of ventilation, which has actually been in use for some time on all the best airlines. It sounds like some system for pukka Poonah sahibs, and it is described as giving the passenger a direct blow of cool air during squeamishness. Nothing is said about the squirmishness of the passenger immediately behind, for that, in fact, is the snag about the supply of a personal miniature gale to each passenger. He or she cannot keep it to him or herself. British, Dutch, French and American machines all use the system, for want of a better, perhaps.

Magicians seem the vogue just now. Professor Emerick Herzog arrived by air from Vienna one day last week. He is a super dowser, and uses a silver forked rod, whereas the ordinary diviner uses a rod of hazel. The professor either hit a large bump or else the rod twitched when about twenty miles from Croydon, which told him, he says, that he was right over unlimited supplies of oil. Maybe there is a petrol store in those parts, but, if not, the new oil wells will come in handy when we all use heavy oil engines. The professor went on to say that "Some time previously, whilst flying over Wales, the rod reacted

as it only does when there is gold about—tons of it." But surely this "some time previously" does not refer to the same flight from Vienna to London?

Somebody asked me recently why, alone of all commercial aeroplanes coming in to Croydon, the big German Diesel-engined machine bore on its prow a coat of arms with helmet and crest correctly emblazoned heraldically. The answer is that the machine was christened by the late General Field-Marshal von Hindenburg, after whom it is named, and that it bears his family coat of arms.

In these days of the sheltered life of the totally enclosed pilot's cockpit and all that, where do the younger pilots get their hearty brick-red seafaring complexions so necessary to give the eyes that piercing, eagle, far-away sort of look the pilot of fiction and the films always has? The secret is that many pilots, in this fine weather, are to be found basking and bathing in the Purley Way swimming pool just across the road. Last Saturday afternoon there were the complete crews of evening French, German and Dutch machines disporting themselves in that convenient bath. All of them had come in from their respective countries during the morning and would sleep at home that night.

At last there seems to be some real movement in official circles towards installing the Lorenz system at Croydon. The Romans had a festival called the Robigalia. Possibly someone has been practising this ancient rite in the vicinity of those who preside over getting things done for the benefit of civil aviation. The festival was for the avoidance of mildew.

By the way, the fact that the official door by which passengers leave the Customs is held open by a galvanised iron dustbin, which also serves the humble but useful purpose for which it was designed, was hotly queried the other day by an indignant air traveller. An extremely loyal employee of the airport authorities defended the practice to the best of his ability, pointing out that when it was not very hot weather (which it was), and if people wouldn't put fish in the bin (which they had done), it was quite a sound practice if the lid fitted (which it didn't) except for the clouds of gadflies and things which it led to. In spite of all this, the air traveller, already feeling not too grand on arrival, seemed unreasonably peevish. One almost feared he would suggest a proper door-stop.

A. VIATOR.

Winter Sportings

IF all goes well, winter sports enthusiasts will be able to fly direct from Croydon next season to the Engadine, for it is proposed to construct an airport at a large field at Samaden. The only problem facing the towns that will benefit is the raising of a matter of £13,000.

South Atlantic Lioré 47 Tested

TRIAL flights of the Lioré et Olivier 47 (four Hispano-Suiza 12 Ybrs of 860 h.p. each), the second of the two Air France flying boat prototypes that have been specially constructed for carrying mail and passengers on the South Atlantic service, have been proceeding at Antibes.

M. Bourdin, Lioré's chief test pilot, has made four trial flights and has expressed his complete satisfaction with the seventeen-ton craft. Last week the LeO 47, when flying at its all-up weight of 40,000 lb., became airborne in 40 seconds without recourse to the slotted flap installation.

Putting the Steel City on the Air Map

MANY people in the Sheffield steel industry, which has such close associations with aircraft manufacture, have long felt it something of a disgrace that the City should show so little interest in the possibility of a municipal airport.

Now, however, comes news that the Air Ministry last week approved the first part of a scheme for acquiring a site at Todwick. There has been controversy over whether the airport should be at Norton or at Todwick. Yesterday the city council was to receive a report outlining a scheme for making Todwick suitable for the purpose.

The estimated cost of land, excluding Todwick Grange, will be £200,000. The site, which covers some 500 acres, is about ten miles from the centre of Sheffield.

Southampton's Bid for Empire Base

PORTSMOUTH City Council having still failed to agree with the Air Ministry over financial aspects of the Langstone Harbour scheme, the centre of interest in the Empire boat base project appears to have shifted back to Southampton.

Plans prepared by the Harbour Board were discussed informally last week by Mr. Harry Parsons (chairman of the board), Mr. Ivor McClure and Mr. Maurice Banks (Air Ministry) and Capt. F. C. Bailey of Imperial Airways. They inspected various sites in Southampton Water, accompanied by the official hydrographer of the Harbour Board.

But apparently Portsmouth is not yet entirely out of the picture. On Tuesday it was reported that Major H. D. Gilbert, a member of the Council, had offered 30 acres of land, adjoining Langstone Harbour as a free gift.

All was Well at Salwa Wells

WHEN, at the Lympne International Rally on Sunday, it was announced over the loud speakers that the Imperial Airway's liner *Horsa* had been found, her passengers and crew safe and sound, there was heartfelt applause from the crowd.

And that was how everyone must have felt, for the duration of search—some 27 hours—along the desolate Arabian coast of the Persian Gulf was becoming ominously long.

Horsa, with eight passengers and four crew, left Basra on Friday night for Bahrein Island, in the Persian Gulf, but seemingly missed it in the darkness, for she landed at Salwa Wells, which is 100 miles south of Bahrein. Apparently the pilot, Capt. L. V. Messenger, cruised round until it was light enough to find a spot in which to put the H.P. 42 down before fuel ran out. Slight damage to the undercarriage was sustained.

Initial reports do not make it clear whether *Horsa* was first sighted by an R.A.F. machine or an Imperial Airways craft.

CLOUD CEILING. A large auxiliary aerofoil is mounted above the engine nacelles (which carry Pratt and Whitney Wasps) on Mr. O. S. Baker's Saro Cloud amphibian.

Commercial Aviation

A Start in Ireland

WORK has now commenced on the new transatlantic air base at Rynanna, County Clare. About forty men have been employed as a start, and this number will be increased as the work goes on.

During the week an official of the Land Commission visited the district for the purpose of examining the receiving orders of all those whose lands will be affected as a result of the expected development.

An aerial survey of the district was carried out recently.

Avoiding the Junk

THE exceptionally busy nature of Singapore Harbour is likely to raise some problems in the handling of the new Empire boats.

A special seaplane channel is being provided which will enable the boats to alight in the harbour and taxi across the water to the slipway and hangars. Tenders have been invited for the reinforced concrete piling which will be necessary for anchorage and approach channel.

This channel will be about a mile long, being clearly marked and protected by booms, and being kept quite clear of junks or other small native craft. Rapid progress has been made in the construction of the seaplane slipways and hangars themselves.

Celeste Octet

FIGURES which have just become available show that eight Imperial Airways pilots have, between them, now flown a total of 83,506 nours. These eight, with their respective hourage figures, are:

O. P. Jones	11,938
W. Rogers	11,189
H. H. Horsey	11,105
A. B. H. Youell	10,181
H. H. Perry ... ... (over)	10,000
F. Dismore	9,919
A. S. Wilcockson	9,798
L. A. Walters	9,376

These figures, if converted into approximate figures for distance flown, indicate that the eight veterans have flown a total of nearly 10,000,000 miles.

Heston Happenings

THE Airwork design staff have produced some special fittings for Dragonflies. For Mr. Loel Guinness the control wheel has been extended downward so that the pilot can keep one or both hands on it while resting his forearms on his knees. Mr. Guy Robson has had a neat blind-flying hood running on rails fitted to the pilot's compartment of his machine.

Mr. E. K. Megaw, of Birkett Air Service, has returned from three weeks in and out of Madrid, ferrying pictures and news to Paris. Like Mr. Spratt, of Air Commerce, he has suffered from nothing worse than food poisoning.

The Deputy Director of Civil Aviation in Egypt, Roushdy Bey, and the managing director of Misr-Airwork S.A.E., Kemal Eloui Bey (just returned from the I.A.T.A. conference in Stockholm), are on a visit to England. They will inspect the Airwork Reserve Training School at Perth and the Air Service Training organisation at Hamble with a view to the possibility of similar reserve training operations being undertaken by Misr-Airwork in Egypt.

Commercial operators in particular should appreciate the value of the Cambridge mixture indicator, described in the accompanying paragraph.

Kemal Eloui Bey and Mr R. E. Grant-Goven, Managing Director of Indian National Airways, were present at a demonstration of the Miles Whitney Straight at Heston on September 2. Its use is envisaged in Egypt as a training aeroplane, and in India for the training of airline pilots and the carriage of mails. Incidentally, the Airwork Sales Department expects to take delivery of its Miles Whitney Straight demonstrator early in October.

An order has been placed for a third D.H. Rapide to join the two already operated by Airwork, Ltd., on behalf of the Anglo-Iranian Oil Company in Iran.

The new firm of Croydon Airways, Ltd., has bought three D.H. Moths from the Airwork Sales Department for its instructional work.

Airwork is adapting a Philco car radio for a private Hornet Moth, and they have seen fit to retain the loud speaker. The significance of this can hardly be under-rated. A few years ago nobody had a loud speaker in his motor car because of the noise made by the car. That a sensible aeroplane owner should include the extra weight of a loud speaker in his receiving set seems to the compilers of *Heston Flying News* an occasion for solemn jubilee in the houses of Rumbold and De Havilland, and for a poem entitled "Ring out, wild decibels!" by one of the leading "sonotorieties" of the B.B.C.

The New Karachi Airport

TENDERS will be called for very shortly and complete plans and estimates are now ready for the new administrative buildings at Karachi airport. In these will be incorporated every amenity for air passengers as well as for actual control. The full scheme of development will cost in the neighbourhood of half a million rupees, and work is expected to start in October. The building will, in some measure, resemble the Willingdon air station at New Delhi.

On the airport work is in progress on the night-lighting scheme system and the equipment for the boundary lights is in position. New roads and improved drainage are being provided, and the latter will run round the landing area and will be capable of dealing with any excess rainfall. When the present schemes are completed the new airport will extend over an area of approximately four square miles.

Edinburgh's New Site

EDINBURGH Corporation's search for a municipal airport site has been transferred to East Lothian, and what is said to be a really good situation near Aberlady, fourteen miles from the city, and near the Firth of Forth, has been discovered.

It is understood that, while no negotiations have taken place, the Corporation will be strongly advised to buy the site, which is part of the policies of a large estate.

A few months ago, it may be remembered, the Corporation bought a municipal airport site near Gilmerton, Midlothian, at a cost of about £9,000. The ground, which extends to 77 acres, is situated in the heart of the Lothian coalfields, where subsidences repeatedly occur. Since being acquired by the Corporation the ground has been used only for growing crops, and no effort has been made to develop it.

Lord Provost Gumley and Mr. David Robertson, town clerk, recently discussed the aerodrome proposition with the Air Ministry.

Exhaust Gas Analysis in Flight

AN extremely practical and interesting instrument, evolved by the Cambridge Instrument Co., Ltd., continuously analyses the exhaust gas from the engine or engines, and, by giving dashboard readings, enables carburetter adjustments to be made to give the most efficient settings during flight.

The Cambridge mixture indicator, as it is known, works on the well-tried thermal conductivity system. A connection to the exhaust manifold continuously collects samples of the exhaust gases and passes them through an analysing unit, from which electrical connections are made to balancing and control boxes in the pilot's compartment. The latter units are in turn wired to the dashboard indicator, which, in the case of a twin-engined machine, is of the type shown in the accompanying illustration. The analyser unit contains a filter cartridge which is easily removable for cleaning.

The complete instrument (all units) weighs 7lb. 11oz. and operates from the twelve-volt aircraft electricity supply. Full details are obtainable from the makers, the Cambridge Instrument Co., Ltd., 45, Grosvenor Place, London, S.W.1.

MORE FULL-SCALE STALLING

Part III.—A New Aspect : "Deep" and "Shallow" Stalls : Further Evidence and Summing Up

By W. E. GRAY

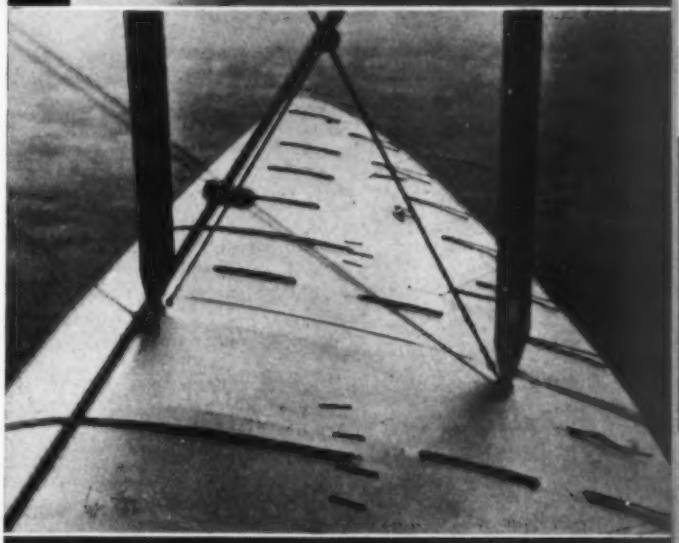
IN the first two articles of this study (see *Flight* of July 16 and 23) an outline was given of the preliminary investigations made in attempting to check the theory that had been formulated, and some of the full-scale tests were described. Since then numerous further tests have been carried out, and in the present—and, it is hoped, the concluding—article, the results will be set out briefly so that those interested in the subject may be able to form opinions for themselves regarding the validity or otherwise of the ideas put forward.

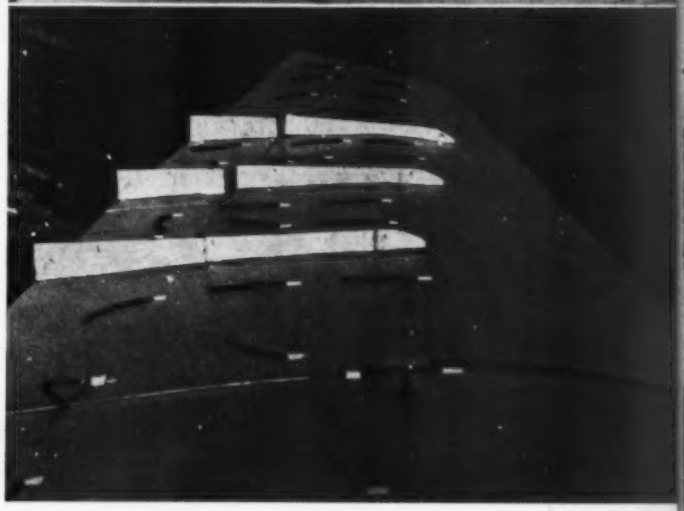
In the first article, reference was made to the discovery, in tunnel tests, of what seemed to be a new peculiarity of flow associated with the sweeping of a wing, and a promise was given to deal with it later if it were found to be real at full scale; this it does seem to be, and what will be termed "deep" and "shallow" stalling will be described. The earlier points that have been raised in the Correspondence columns of *Flight* have already been replied to briefly there, and do not seem to call for further comment, but the letters from Mr. Lock, of the N.P.L., and from Mr. Needham printed in *Flight* of August 27 will be dealt with here. Then, again, doubts had been expressed to the writer regarding the validity of the "theory" advanced, and further model and full-scale tests have therefore been carried out in an attempt to reach the truth; a description of these, too, will be given.

Swept-back Wings

First of all, to link up with the second article, I promised to give photographs of the airflow on the Bücker biplane with its swept-back wings; unfortunately Herr Pabelick had apparently to return to Germany in too much of a hurry to be able to get in touch with me again before departing; an attempt was made later to secure a similar machine, but that, too, fell through. To take the place of this a test was therefore carried out on a D.H. Tiger Moth; this might have been done at the start, but, frankly, it seemed a little doubtful if the relatively small sweep-back of the Tiger would show sufficient bending to give clear photographic reproduction. The result, however, was quite definite and is shown in Fig. 1, the flows at 50 and 60 m.p.h. being superimposed on one print; it should be noted that the zeros are parallel to the wing ribs and in straight, fast flight the yaw-meter should and did read 6 deg., the approximate angle of the sweepback, for the ribs are at right angles to the L.E. and T.E. Between 110 and 60 m.p.h. there is little change in the direction of flow near the T.E., but when the speed is reduced to 50 m.p.h., or just before the stall, the flow bends out as shown by the wool and finally breaks down in an outward direction; there was a slight sideslip accentuating the bending at 50 m.p.h.—the "yaw-meters" do not quite coincide—but the error is not great.

In Fig. 2 is shown the flow over the lower wing of a tapered D.H. Hornet Moth, the flows at 70 m.p.h. and 46 m.p.h. being superimposed—46 m.p.h. on the A.S.I. being very close indeed to the beginning of the stall. It should be noted that the inner "yaw-meter" is influenced by the flow past the wide fuselage and always read 4 deg. in straight flight; the flow over the inner part of the wing, where the T.E. is at 90 deg. to the direction of flight, remains unbent right down to the stall; over the aileron, where the T.E. is swept forward increasingly, the bending inward of the flow with reduction of speed can be seen to be quite marked; this is in agreement with all the previous evidence collected and with the theory advanced, and as this plan-form combined straight and swept sections of T.E., and had a normal wing section (instead of a reflexed T.E., as on the Monospar), it was felt that a test on it would be worth while. Reference was previously made to a brief test on a Dragonfly, and it was thought that the Hornet would be even more informative.





(Top to bottom) Fig. 1 : Superimposed photographs of the tufted Tiger Moth wing at 50 and 60 m.p.h. Fig. 2 : The Hornet Moth wing at 46 and 70 m.p.h. (superimposed). Fig. 3 : The Swallow, with fins to prevent bending of the surface layer flow.

Let us now turn to the question of the "theory" and consider some further points of the problem. It was suggested to me in connection with the Swallow tests that it may be the stall at the root that causes the bending, instead of the bending causing the stall there; this appeared to be a valid objection, but it seems to be fully answered by the Tiger Moth photo, for there we have marked bending without any stall to cause it, and, further, the Hornet flow confirms this. It was thought advisable, however, so as to put it beyond doubt, to

Fig. 4 (top): The Leopard Moth in straight flight; the tufts indicate a stall just beginning at the wing roots. Fig. 5: A sideslip of 14 deg. immediately before the stall.

do a new test on the Swallow: If the bending of the surface layer of flow were to be prevented by some artificial means, and the stall developed as before, it would be clear that the bending was not causing the stall; some rough three-ply fins were therefore fitted, as shown in Fig. 3, to try the effect, and although they were not over so much of the span as they might have been, owing to its being a somewhat hurried preliminary test, they did show the nature of the spread of the stall to be altered, and it was not thought worth while to repeat the test for mere appearance. It will be seen that the flow breaks down in each section independently, the inboard part of each section stalling first, instead of the stall spreading outward from the root as it did without the fins—as was shown in the photographs that were printed with the first article. A short film was also taken, and the change in the manner of stalling can be clearly seen. It should be noted that the length of wool beyond the forward part of the outer fin is caught on a wing bolt, and is not stalled. The exposure was 1/100 sec. The influence on maximum lift appears to be negligible, however, for there was no noticeable tendency for the machine to drop one wing or the other at any incidence around the stall—fins only being fitted to one side.

It seems to be quite clear, all the same, that once the root part of the wing has stalled it will suck away the "dead" air that would otherwise accumulate near the T.E. of the more outboard parts and thus delay the stall there to some extent. This was strikingly shown on the cinematograph film of the flow on the Monospar; the stall started somewhat inboard of the aileron, and immediately the surface flow over the aileron was suddenly bent inward so as to be about parallel to the trailing edge, but the flow just ahead of the aileron was not noticeably altered; this would seem to be obviously due to the fact that the pressure over the inboard part near the T.E. dropped suddenly to the stalled value, whereas the pressure over the aileron was more nearly atmospheric; the pressure diagram curves for stalled and unstalled conditions probably cross in the region of the aileron spar. This tendency of a stalled region to suck away the dead air near the T.E. in its vicinity probably accounts for the peculiarity found in some recent American tests where a tapered wing of high aspect ratio was found to stall in patches along the span, with unstalled regions between; apparently the stalling of the patches helped, in this way, to maintain the flow over the intermediate parts.

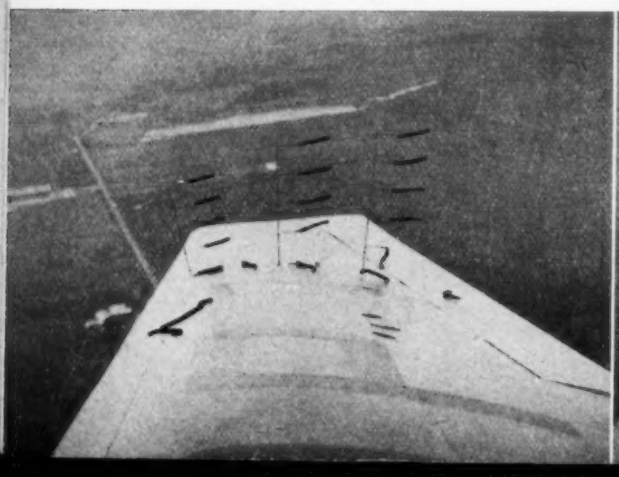
The point was also raised as to whether a transverse surface flow really does interfere with the flow over it so as to encourage a stall, and a tunnel test was carried out to find what the effect was. Air was conducted from the under-surface of a wing and emitted from under a thin covering over the upper surface extending over the rear half of the chord; the aperture was about one per cent. of the chord in depth and extended chordwise. The flow of air over the surface caused stalling several degrees earlier in that region, the flow on either side being steady.

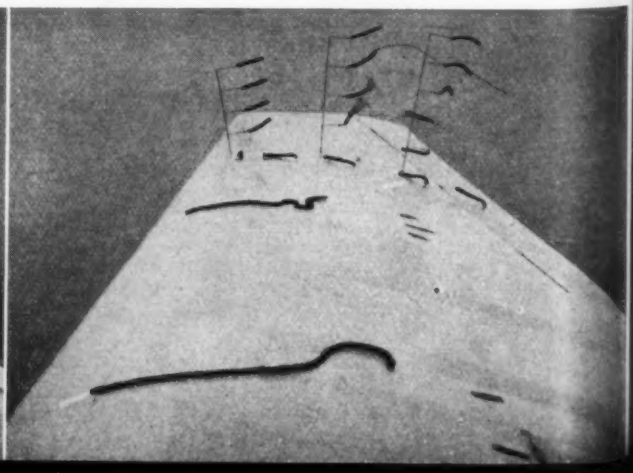
The High-wing Monoplane

Reference will now be made to two photographs of the flow over a D.H. Leopard Moth wing, shown in Figs. 4 and 5. These proved rather difficult to get, as careful co-operation was needed, and the camera imposed limitations of distance if a sharp image was to be obtained. Actually it had been desired to get a picture of the down-wind wing stalling first in a sideslip; a high-wing machine was chosen in the hope of eliminating body interference, and a wing with considerable taper was decided on as being of more general interest; although the phenomenon was observed visually to a fair extent it was not caught with the "still" camera. With too much sideslip the centre-section spoils the flow over the root on the down-wind side and it stalls before the outer part. Fig. 4 shows a straight stall just beginning at the wing roots, and from other photos this is seen to be closely followed by stalling over the inner parts of the ailerons; it will be seen that the flow there is most bent, and therefore presumably most retarded. A number of thinner lengths of wool were supported 5in. above the surface, and although they may not be visible in the reproduction, they do show considerable bending also. Other photos show the flow over the wing tips to be quite good after a great part of the wing is stalled. Fig. 5 shows a sideslip of 14 deg. just before the stall, and in drawing any conclusions it should be remembered that the bending of the flow on the starboard aileron is accentuated by the fact that it is down in order to hold the sideslip, while on the port one it is reduced; the disturbed flow in the wake of the centre-section is clearly shown, but the convergence of the surface flow near the tip of the starboard aileron and divergence on the port one are not so evident as on some of the other photos taken. The exposures were 1-300th sec.

Attention will now be given to what I have termed "deep" and "shallow" stalling. It was found when studying the flow over a model tapered half-wing with varying degrees of sweep, in the early part of this work, that the breakdown of the flow at the stall varied very considerably with sweep

Fig. 6 (left): A "shallow" stall on the B.A. Swallow, with the wing yawed forward 5 deg. Fig. 7: A "deep" stall with the wing yawed back 10 deg.





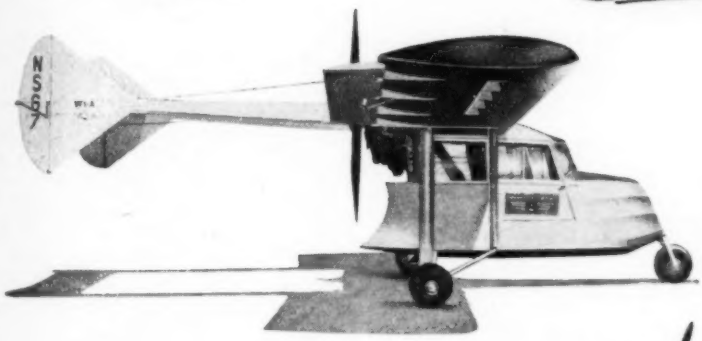
as regards the depth of the stalled region and the angular change of the downwash at the stall; these are the "further peculiarities of flow" mentioned at the end of the first article. The fact that the depth of the stall varied with yaw on the Swallow was seen and filmed later, and "still" photos were taken afterwards. Two typical specimens appear in Figs. 6 and 7, and in a way they are perhaps more interesting than some of the others, as showing a different side of the problem; Fig. 6 shows a shallow stall, with the wing forward 5 deg., and Fig. 7 shows a deep stall when the wing was yawed back 10 deg.; with no yaw the stalling was intermediate.

Now, it will be seen that in Fig. 6 a little aileron was needed to hold the wing down, and in Fig. 7 rather more was needed to hold it up; these confirm the amounts of yaw, which are no longer readable. In Fig. 6 the stall has had long enough to develop to have swept the "yaw-meter" right forward, the surface flow is reversed except near the L.E., and yet the turbulent region is quite shallow; this, in fact, seemed to be its permanent state so long as the attitude could be held. Fig. 7 shows a very different state of affairs; the stall was caught in the act, and although the surface flow at the masts is reversed it has not had time to sweep away the nearby yaw-meter, nevertheless the flow has at once been disturbed to a great depth, and its final state is somewhat worse than that shown. The exposures were 1-150th sec.

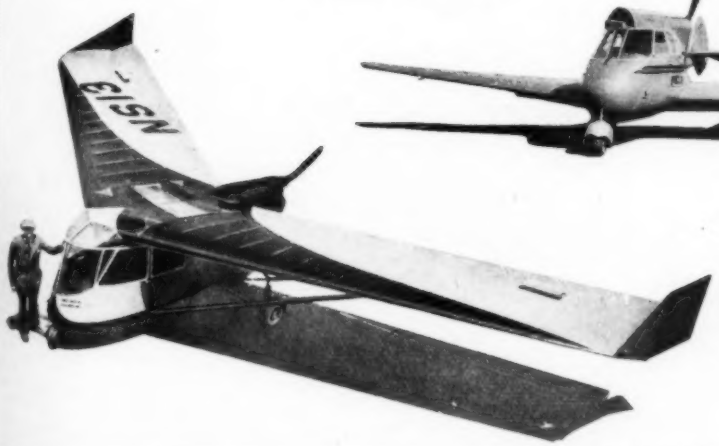
The only explanation of this behaviour that I can offer at present is that when the wing is forward the bending of the surface flow causes the dead air to accumulate at the inboard end of the wing, or, if it is truer, to be sucked away from the tip, whereas when the yaw is the other way the reverse holds good; the T.E in the two photos was 15 deg. forward and normal to the wind, respectively in Figs. 6 and 7. In the tunnel tests it was found that with considerable sweep-forward there was no sudden change of the downwash angle even though a shallow layer of surface stalling had taken place, and that the downwash angle even went on increasing with increase of incidence for a very considerable time—in fact, one could hardly say that the outer part of the wing had stalled in the ordinary sense at all; this was with a 2.5 to 1 taper and 10 deg. or more sweep-forward of the L.E. It was impossible to check if the Swallow behaved in this way because the stalling of the rearward wing caused it to fall so rapidly with 10 deg. yaw that the forward tip could not be made to stall at all: a number of film shots were taken while the wing-tip came up overhead without any sign of a stall. It would be interesting if it could be confirmed on a machine with control surfaces of sufficient power to force it into the attitude required—something like a flick roll, in fact. In connection with the depth of stall it is interesting to study the diagrams in R. and M. 1203, for it is fairly obvious that something of the sort was happening there, too; the pressures in different

(*Concluded overleaf.*)

IN SEARCH of the PRIVATE OWNER'S IDEAL



The four machines designed to the order of the U.S. Bureau of Air Commerce and mentioned by "Indicator" in "Topics of the Week" in the Private Flying section of this issue. Above is the fairly conventional all-metal Curtiss-Wright monoplane and on the left is the far-from-conventional Weick pusher in which all normal manœuvres are carried with only two controls. The slot-cum-aileron can be seen in the centre of the wing.



First of the Bureau experiments was the Hammond, shown above. On the left is the Waterman monoplane, which is somewhat similar in general layout to the Hammond and the Weick, but which has no tail and is vaguely reminiscent of the original Westland Pterodactyl.

More Full-scale Stalling (*continued from top of previous page*).

stalled regions vary greatly, which means that the downwash angles must vary correspondingly.

In R. and M. 1491 there are given the results of swept wing tests made in 1930, and published in 1933; these were on wings of uniform chord, and Figs. 17 to 20 of that work clearly show that there must have been some drastic change in the type of flow with varying amounts of sweepback and sweepforward.

Since the foregoing was written Mr. Lock's letter has appeared, and perhaps I may be allowed to give attention to the criticisms contained in it: broadly, Mr. Lock seems to say, politely, that the transverse pressure gradient idea is all nonsense; well, that may be so, but let us study his arguments. One must be very careful indeed in applying the results of reasoning based on assumed conditions, as Mr. Lock says they have been assumed for the Prandtl theory, to a set of real and different conditions such as an aeroplane in air—even though the imaginary conditions may help us as a simplifying step. Unlike Professor Einstein, Dr. Prandtl has not found any slight errors in Newton's laws of motion, and Newton's simplicity is always refreshing and is worth keeping in mind: until one is able to study the flow of non-viscous air over the infinitely long wings of the Lancaster-Prandtl aeroplane in free flight one cannot use arguments based on its presumed behaviour and apply them with any certainty to real conditions. Now Mr. Lock says that with two dimensional flow in an ideal fluid, there will be no transverse flow (in line 15 he seems to use "transverse" in a different sense) with yaw; it is equally true, of course, that there is no downwash, in spite of there being lift. The explanation is that the lift is obtained by action on an infinite depth of air, so that the velocity imparted to it is infinitely little and therefore the kinetic energy left behind is infinitely small; there is thus no induced drag. In the same way there can be a transverse force without any transverse flow.

Real Conditions

But in a real finite aeroplane which can only influence a limited quantity of air, there is a definite downwash created in the generation of the lift, and similarly, if there is a transverse force on a yawed wing, as there is, there simply must be a transverse flow. If we take an extreme case and set a yawed wing at 45 deg. incidence, it is obvious that there is a large side load and a considerable lateral bending of the flow; a yawed wing, even below the stall, is only a mild case of this kind. (In parenthesis, it is perhaps of interest to note here, for the benefit of those who hate complexities, that the advantage of a big span for an aeroplane as a means of keeping down induced drag lies in the fact that lift depends on the momentum imparted to the air, while the energy left behind depends on the kinetic energy imparted; as the momentum is proportional to the downwash velocity and the kinetic energy is proportional to the square of that velocity, it obviously pays to deal with a large quantity of air, by means of a big span, and give it a low velocity.)

Mr. Lock wishes to resolve the flow over the yawed wing into planes normal to the wing and a component along the span—which, he says, will not upset the equilibrium of his component of ideal flow along the chord (if one understands him correctly). He then wishes to apply this method to an infinite wing in real air and says that there will be a "tendency for the *boundary layer* to be carried along by the transverse flow." But here it must be pointed out that his transverse component is purely imaginary and that the only real flow is down-stream, and how this down-stream flow can carry the boundary layer in a direction other than down-stream is very difficult to see; for the fact remains, as shown by the photographic evidence, that the surface flow is often very far from being down-stream. It would be a great help if Mr. Lock could explain what he thinks causes this change of direction and why it is impossible and fallacious in his opinion to consider it as due to the cross-wind pressure gradient as originally suggested; he has offered us no explanation showing why the flow cannot be bent as indicated in Fig. 2 of the original article; does he dispute that there is a cross-wind pressure gradient? According to Newton the flow should continue straight unless acted on by a side force. It would also be helpful if he could say whether he considers the viscosity sufficient to enable his transverse "component" to get a grip on the boundary layer and carry it along both before and after the stall and more especially to carry along the "dead air" as well after the stall, without any assistance from pressure differences; the idea seems to be widely held that it is the inability of the main stream to carry the boundary layer away with it that leads directly to the stall.

It is interesting to note that Mr. Lock at least grants that with a yawed wing the dead air is carried along somehow and accelerates the stall at the down-stream end while delaying it at the forward tip, and that sweeping the T.E. forward similarly accelerates the stall at the root. What is even more interesting is his implication that "the ordinary Prandtl theory of a monoplane wing" only holds good if the T.E. is straight; that seems to call for a reply from Gottingen.

Finally, Mr. Lock, after referring to the imagined bending near the L.E., as a "further example of the fundamental fallacy" of the theory advanced goes on to say that a yawed L.E. will have "little effect, because the boundary layer there is thin;" he does not seem to feel sure that it will have no effect. It was never suggested that it would be likely to have much effect, and was regarded as unimportant.

It still seems to me that it is the influence of the cross-wind pressure differences on the flow near the surface just before and during the development of the stall that determines very materially the manner in which the stall takes place. And turning again to a consideration of a swept-forward wing at a small positive incidence as being a mild case as compared with the same wing at 45 degrees incidence, it seems clear that there must be quite a considerable mass of air bent inward by each half of the wing, and not just the boundary layer alone; again the pressure differences seem the only reasonable explanation, as these extend to a considerable distance from the wing.

For want of a comma, Mr. Lock almost gives the impression that I am connected with the N.P.L., and it should perhaps be made clear that I have never had that pleasure, although I have always found the N.P.L. staff very helpful and encouraging when I have come in contact with them, and I wish to thank Mr. Lock for joining in this discussion.

Turning finally to Mr. Needham's second letter, it does not seem sound to consider arbitrary "components" of flow and their inter-action as though unaccompanied by the remaining components; it is like saying that because two cars meeting head-on at 2 m.p.h. come to rest in the road the same will happen with two cars moving at 20 m.p.h. and converging with a relative velocity of 40 m.p.h. Mr. Needham's explanation regarding a *difference* in the strength of the tip vortices in a sideslip is welcomed, for his previous wording did not make his meaning clear; but whether it is the reduced vortex that *causes* the earlier stall or whether the reduction of lift on that side caused by an accumulation of dead air causes the reduced vortex, is perhaps, debatable. The suggestion of model tests with fixed aspect ratio and span, to find the effect of sweeping the edges separately, remains impracticable, for the taper is being varied all the time and will confuse the results.

I do not intend, at present, to carry this work any farther single-handed unless some new point is raised and requires investigation. It is hoped that enough has been done to arouse interest in these questions, and that some small contribution may perhaps have been added to our knowledge of stalling, and therefore, to safety.

Forthcoming Events

August 29-Sept. 6. British Gliding Association: Annual Competition, Gt. Hucklow, Derbyshire.
August 30. Gordon Bennett Balloon Race, Poland.
September 4-5. Magyar Athletic Club Motor Section: International Flying Meeting.
September 5. Bristol and Wessex Aeroplane Club and Bristol Branch, R.Ae.S.: Garden Party
September 5-6. Aero Club of Hungary: Week-end Aerien.
September 12. London Aeroplane Club: Hatfield Garden Party.
September 12. Rochester Empire Air Week Display.
September 13. Aero Club de France: Coupe Deutsch Race.
September 19. Cardiff Aeroplane Club: London-Cardiff Race.
September 19. Three Counties Air Race, Hereford.
September 20. London Air Park Club: Display.
September 29. London-Johannesburg Race.
October 8. R.Ae.S. Lecture*: "Tapered Wings," by Dr. G. V. Lachmann.
October 22. R.Ae.S. Lecture*: "Economics of Airline Operation," by Mr. L. T. H. Greig.
October 25. Aero Club de France: Saigon Race.
November 12. R.Ae.S. Lecture*: "Skin Friction," by Dr. F. W. Lanchester.
November 13-29. International Aero Exhibition, Paris.

*All R.Ae.S. lectures take place at the Royal Society of Arts, 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.

THE LONDON-JOHANNESBURG RACE

—*Starting from Portsmouth! Fourteen Machines Entered: Preponderance of Percival Types*

LATE entries for the Schlesinger African Air Race closed last Friday, by which time the Royal Aero Club had received two new entries in addition to those already announced, thus bringing the total up to fourteen machines. An examination of the list discloses the fact that one-half of the machines are of Percival design and manufacture, namely, four Vega Gulls and three Mew Gulls. Next of individual firms come Phillips and Powis, with three Miles machines, a Sparrow Hawk, a Hawk Six, and the Peregrine. The British Aircraft Manufacturing Company is represented by two types, an Eagle and a Double Eagle, and Airspeed, Ltd., and the De Havilland Aircraft Co., Ltd., by one type each, an Envoy and the D.H.92 Dolphin respectively.

The London-Johannesburg race, for prizes totalling £10,000 presented by Mr. I. W. Schlesinger, is divided into two sections, a speed race and a handicap race. The two sections are to be flown concurrently, but no competitor can win both first prizes.

Handicap speeds will be calculated according to the formula

$$V = 150 \left(1 - \frac{0.5\,L}{W - L}\right) \times \left(\frac{P}{A}\right)^{\frac{1}{3}}$$

in which V is the handicap speed in m.p.h., L the payload in lb., W the all-up weight of the aircraft in lb., A the main plane area in sq. ft. inclusive of ailerons but exclusive of fillets, and P the engine power at normal r.p.m.

The last part of the formula is not subject to variation by the designer, unless he clips his wings, and as standard machines are being used in the race, there is nothing the designer can do to "steal" a few m.p.h. in this section.

That part of the formula which deals with gross weight and payload is subject to the discretion of the entrant of the machine. If a very large payload is carried, the speed on which the machine's handicap will be based will also be low. In the case of the Vega Gull, for example, the gross weight is 2,750 lb. If the payload is approximately the equivalent of three passengers, or 500 lb., that part of the formula will give the Vega Gull a speed of 133 m.p.h. If the payload were increased to 700 lb., or approximately the equivalent of four passengers, the speed from this part of the formula would come down to 124.5 m.p.h. But the machine would have lost a considerable amount of range through carrying that much less petrol, and as all time spent on the ground counts as flying time, a long range is obviously desirable in the race.

Just as *Flight* is about to go to press with this issue, the Royal Aero Club announces that the London-Johannesburg Race is to start from Portsmouth; we gather, however, that the machines are not expected to overshoot at the other end and finish up in Capetown. The first machine will be sent away from Portsmouth aerodrome at 6.15 a.m. on Tuesday, September 29, and the rest will follow at one-minute intervals, the times being adjusted at the Cairo control. Imperial Airways are rendering valuable assistance by lighting up their aerodromes down through Africa during the nights of September 29, 30 and October 1. Competing aircraft must be at Portsmouth aerodrome five days before the start.

THE ENTRIES.

Racing Number.	Reg. Marks.	Entrant.	Pilot.	Aircraft.	Engine.
1.	ZS-AHM	Len Oates	Capt. A. M. Miller.. ..	Percival Mew Gull ..	Gipsy Six.
2.	ZS-AHO	Capt. S. S. Halse	Entrant	Percival Mew Gull ..	Gipsy Six.
3.	G-AELT	Victor Smith	Entrant	Miles Sparrow Hawk..	Gipsy Major.
4.	G-AEIN	Henry S. Horne	Flt. Lt. T. Rose	B.A.4 Double Eagle ..	Two Gipsy Six.
5.	G-AEKD	Lt. Misri Chand	Lt. Misri Chand, Lt. P. Randolph.	Percival Vega Gull ..	Gipsy Six.
6.	G-AEKE	Sir Connop Guthrie ..	C. W. A. Scott	Percival Vega Gull ..	Gipsy Six.
7.	G-AEAB	D. W. Llewellyn	D. W. Llewellyn, C. F. Hughesdon.	Percival Vega Gull ..	Gipsy Six.
8.	G-ADOD	F/O A. E. Clouston and F. E. Tasker.	A. E. Clouston	Miles Hawk VI ..	Gipsy Six.
9.	G-AEMX	De Havilland Aircraft Co., Ltd.	H. Buckingham	D.H.92 Dolphin ..	Two Gipsy Six.
10.	G-ADID	C. G. M. Alington	C. G. M. Alington, Lt. P. H. Booth, R.N.	B.A. Eagle	Gipsy Major.
11.	G-AEDE	Bateman Scott	Flt. Lt. H. R. A. Edwards, Sqdn. Ldr. B. S. Thynne.	Miles Peregrine ..	Two Gipsy Six.
12.	UP-KEE	John E. Carberry	Entrant	Percival Vega Gull ..	Gipsy Six.
13.	G-AENA	Max H. Findlay and Kenneth Waller	Entrants	Airspeed Envoy ..	Two Armstrong Siddeley Cheetah.
14.	G-AEKL	Air Publicity Ltd... ..	T. Campbell Black ..	Percival Mew Gull ..	Gipsy Six.

The British Burnellis

THAT Burnelli aeroplanes are to be built in Great Britain "whether anyone buys them or not," was announced last Wednesday at a luncheon given in London by the Aircraft Research and Development Co., Ltd., of Shell-Mex House, London, W.C.2. The Burnelli principle will be familiar to readers of *Flight* from several technical articles, and it will suffice if it is recalled here that the principle includes a fuselage of aerofoil section which gives very roomy passenger accommodation and has the further advantage that it contributes, according to the American National Advisory Committee for Aeronautics, 25 per cent. of the total lift, thus "earning its keep." The constructional methods employed are extremely simple, so that the machine can be manufactured quickly.

A factory has been acquired at Willesden, London, in which the first machine, the UB-14, will be built. A separate company, the Scottish Aircraft and Engineering Co., Ltd., has been formed and will be the production company. This concern will be established on the Clyde, and it is expected that the first machine, built in London, will be completed in approximately six months.

Imperials at Johannesburg

IT is fitting that the British Empire's great airline should be represented at the Johannesburg Exhibition (which opens on September 15). Imperial Airways announce that they will exhibit the display of photographs and models which was at Charing Cross some little time back.

Private Flying

Topics of the Day

Easier Flying

AT one time or another *Flight* has published details and illustrations of the various machines concerned in the researches of the U.S. Bureau of Air Commerce which are aimed at the development of a really easy and safe private owner's machine. Now that four or more of the machines have been delivered this would appear to be an apt moment to review the features and objects of the various designs. Whether or not one considers that the Bureau have set about the business in the right way and with the right ideas is beside the point; the fact is that in the U.S. somebody really has tried to encourage the production of a machine which has been designed solely for the private owner and in which all preconceived notions of what an aeroplane should be have, as far as possible, been thrown away.

The development section of the Bureau was created in July, 1934, and the first machine to be produced was the Hammond Y, work on which had been begun before the scheme was actually started.

Viceless Visibility

THIS machine is a low-wing pusher monoplane with a three-wheeled undercarriage and flaps, but with a fairly conventional control layout. Actually, the first machine did not come up to scratch in the matter of performance; it was redesigned, a new machine was built, and this was delivered in April of this year.

Good visibility, both on the ground and in the air, simplified landing, and a viceless stall were the features aimed at when the machine was designed. In order to prevent the novice quite positively from making any control movement which might precipitate a spin, it was arranged that the rudder should normally be locked, and this is the only abnormality in the control layout.

The three-wheeled landing gear is arranged with the third wheel under the nose, and it is claimed that the Hammond can be flown on to the ground, since the main undercarriage is designed to take any reasonable landing shock. In this country another form of three-wheeled undercarriage has been designed in which the third wheel is behind, and this was thoroughly described in the issue of *Flight* of June 18. The advantage of this scheme is that the pilot cannot make his machine "balloon" once it has made contact, whereas with the Hammond, presumably, a backward movement of the stick after a fast landing would send the machine into the air again. With the others, this machine is illustrated on page 250c.

Simplified Control

THERE were two main reasons for the production of the Waterman tailless machine. One concerned vicelessness and natural stability and the other concerned the possibilities of cheap quantity production. Once again, this machine is a pusher and has a three-wheeled undercarriage in order to simplify the landing process for the beginner.

This type of undercarriage is also fitted to the Weick pusher monoplane, which had, again, been partially developed before the Bureau's plans were announced. Experiments in rudderless control have been carried out on this machine and various devices have been fitted for this object, including special flaps and a combination slot and aileron in the middle of the wing. The tail surfaces are so arranged that, when the machine is trimmed to fly at a certain speed, no alteration in the throttle setting can upset it; the Weick merely glides or climbs as the throttle is closed or opened. This, of course, in a less accurate form, is a characteristic of the majority of machines when these are trimmed for level flight at cruising revolutions. Usually, however, the climb is almost stalled and the glide is a dive.

In brief, the Weick is designed to be a two-control aeroplane. The application of aileron provides a perfectly banked turn and the operation of the throttle control adjusts the climb or glide, and, beyond a certain limit, applies the flaps. The throttle, therefore, becomes the sole angle-of-flight-path control, while the speed remains virtually constant within limits imposed by the adjustment of the elevator. In many ways, therefore, the Weick is the most revolutionary and interesting of the Vidal-inspired machines.

The Curtiss-Wright Coupé, which was also ordered by the Bureau, is intended merely to provide information on the possibilities of all-metal construction and is fairly conventional, though of ultra-modern design. Permanently open slots are fitted to the leading edges.

Lowering Costs

APART from Autogiro developments, which are interesting enough, but which really require separate attention, the rest of the efforts of this section of the Bureau has been devoted to work on the possibilities of using the normal car engine as a power unit and to experiments with belt drive.

In this case, of course, the idea behind the experiments has been that of reducing initial costs and also, in a milder degree, of reducing the running costs. Airscrew gearing is, of course, essential when this type of engine is being used, and it seems that the necessary modifications might eventually prove to be as expensive as a complete aero engine. The only car-engined machine which has been approved by the Bureau is a low-wing monoplane fitted with a converted Ford V8, which develops 82 h.p. and gives it a cruising speed of 90 m.p.h. The machine carries a useful load of about half its own weight and has a range of three or more hours.

We in this country have seen what can be done with a converted car engine in baby aeroplanes, and there might yet be something in the idea. INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

C. A. S. C.

THE trip to France will be made on September 15. Members flew 6 hr. last week-end, Messrs. R. T. Dew and I. R. Mascall taking their first blind-flying instruction.

DONCASTER

Six members attended the "dawn patrol" at Hedon last Sunday. Club machines flew 23 hr. 50 min. for the week ending August 28.

CAMBRIDGE

Eighty hours' flying was logged by Marshall's Flying School, The Cambridge Club and the University Aero Club during the week ending August 30. Mr. and Mrs. Batty joined the School, and Mr. Noordink passed the cross-country test for his "B" licence.

NORTHAMPTONSHIRE

Excellent weather has resulted in increased activity at Sywell. On Tuesday, August 25, Mr. L. H. Wood was married to Miss Ivy Radford. The couple were flown down south by the Club instructor. The Club dance will be held on Friday, September 11.

REDHILL

Messrs. Thomas and Boyce went solo last week, during which the flying time totalled 131 hr. 15 min. Messrs. D. T. Low and J. P. Sargent completed their "B" licence tests. The bombing competition last Sunday was won by Maidstone. There are five new members.

BORDER

One day recently the entire circus of Mr. T. Campbell Black dropped in round about lunch time, their arrival coinciding with the mid-day Isle of Man machines. An A.A. traffic scout would have been useful. Extensions to the present hangar are well under way, but the site for the new hangar has not yet been decided on.

BRISTOL

Arrangements for the garden party are complete. No. 501 (City of Bristol) (Bomber) Squadron have promised to do some formation flying, and a dozen manufacturers are sending machines for demonstration. Flying time for the week ending August 29 was 54 hr. 15 min. Mr. A. D. Brodie became a pilot member.

PORTSMOUTH

A slight haze enabled twelve machines to get into Portsmouth without being spotted during the "dawn patrol" on Sunday, August 23. A Drone was demonstrated and flown by several members. Mr. D. Horner qualified for his "A" licence, and the following became members: Messrs. A. Lee, J. C. Ackerman, R. C. Manocha and Flt. Lt. W. A. J. Stachell. Flying times last week totalled 60 hr. 50 min.

SOUTH COAST

Club members flew 55 hr. last week in first-rate weather. Miss Broad took two friends to the opening of the Hague Airport, Holland, during the week-end. Mr. R. A. L. Pears went solo. Two Club machines were among the attackers on Portsmouth Aerodrome at the "dawn patrol" on Sunday, August 23. One, flown by Mr. Carter, secured two free breakfasts. Messrs. Reed and Dutt started a "B" licence course last week. Other new members included Messrs. Courtney and Batchelor.

HANWORTH

Miss Gayle Pond and Messrs. Scott and Bennett have become members. Miss Pond is from America, where she edits *Popular Aviation*, and has achieved an ambition to take an English "A" licence. Mr. Scott is a member of the Melbourne Aviation Club. Mr. Nigel Watson has gone solo and Mr. J. H. Wells has passed his "A" licence tests.

YAPTON

The total flying time for August was 237 hr. 40 min. New members were: Mrs. M. Irwin, Miss Freda Capes, Messrs. C. Bennett, W. Rollason, Tommy Nash, C. Dash, L. Escott, R. Lezard and E. Wills. Mr. Ali Effat has passed his "A" licence tests. Mr. L. E. Clark took his Avian to Switzerland recently, and on the return journey flew from Berne to Lympne between 8 a.m. and 7 p.m. on the same day.

YORKSHIRE AVIATION

The aerodromes at York and Leeming kept busy during August. At York the flying time for the month to August 29 was 173 hr. 20 min. and at Leeming, for the same period, 36 hr. 10 min. Messrs. Handley, Paige, Dossor, Day and Steel went solo. Miss Liversidge passed the height test for her "A" licence, while Messrs. Frisby, Morris, King-Clark, Lawson-Tancred and Gorhorpe qualified for their "As." The sales department sold a B.A. Swallow to Mr. Campbell and a Hawk to Mr. King-Clark. During York races numerous machines took advantage of the new aerodrome, among the distinguished visitors being Viscount Swinton. "Dawn patrols" have been in full swing, and school machines have "raided" Sherburn-in-Elmet, Hull and Newcastle.

BROOKLANDS

On Sunday, August 23, six machines took part in a "dawn patrol" to Portsmouth, and Capt. Findlay, as usual, secured a free breakfast. The same afternoon Mr. Tom Walls visited the aerodrome and flew with his son. Sir Philip Sassoon's Dragonfly has also visited the aerodrome with Air Marshal Sir Cyril Newall and party aboard. Flt. Lt. Stewart is taking a blind-flying course with Capt. Findlay. Messrs. P. J. Urlwin-Smith and G. May have passed their height tests. Mr. H. J. Hague has completed his "A" licence tests and has become a private owner. New members last week were: Messrs. E. R. Crockatt, C. F. O. Clarke, R. O. Mobbs, J. Leon-Jona, E. W. Evans, G. Pardoe and Pieterse. The forced landing competition will be on September 6, the landing competition for the Hart Trophy on September 13 and Members' Day on September 20.

HERTS AND ESSEX

The aerobatic competition for the Mollison Challenge Cup was won by Mr. V. A. Ercolani, the holder for the last two years. There were ten entries. Mr. H. A. Ellis was second and Mr. H. J. Romer was third. Flying time for the fortnight ending August 28 was 210 hr. 38 min. Messrs. H. J. Romer, B. B. Nicholson and S. H. Engineer completed their night flights, Miss A. Jameson and Messrs. J. P. Mellers, J. H. Hall, G. W. Field and Archer Edwards went solo, and the following became new members: Mrs. E. Mellers, Mrs. M. Drummond, Miss V. Holmes, Messrs. C. Kennett, K. S. Sondhi, H. R. Whately, W. Van Leer, F. C. Pickersgill, M. G. Edgley, A. W. Pettit, J. P. G. Mellers, S. R. Pemberton, A. N. Buckingham, and G. B. Reynolds. The competition for the "Shelmerdine" Challenge Trophy presented by Lt.-Col. Sir Francis Shelmerdine will be flown on Sunday, September 13.

INDIVIDUALITY is expressed in the layout of the new Koolhoven Junior, which has a 50 h.p. Walter Mikron engine and carries two people at a maximum speed of 93 m.p.h.

Private Flying

MIDLAND

The dual and solo times for the weeks ending August 21 and 28 were respectively 31 hr. 5 min. and 28 hr. 45 min. and 29 hr. 25 min. and 28 hr. 55 min. Dr. G. F. Henderson and Messrs. S. Baker and J. Warren have gone solo; Messrs. R. Whitworth and A. White have passed their "A" licence tests; Mr. Colin Gilbert has become a flying member; and Mrs. M. E. Ginder is an ordinary member.

NEWCASTLE

For the week ending August 29 the total flying time was 90 hr. 50 min. On Sunday, August 23, 27 hr. flying were recorded, constituting a club record. Dr. W. B. Allen and Mr. J. G. Wilkes have gone solo. Six Club machines attended the Hedon "dawn patrol" on Sunday, August 23. The Club held a "dawn patrol" of its own at Woolsington on Sunday, August 30, and machines arrived from Hull, Grimsby, Carlisle, York, Leeming and Sherburn.

LONDON

Last week's flying total was 158 hr. 25 min. Mr. A. D. Lode Wistrand went solo, and Mr. L. T. N. Harris completed the test for his "A" licence. The following became members: Mrs. Carter, Mrs. Peake, Miss B. Blanks, Major Colin Cooper, Messrs. K. Alsop, T. A. Aga, F. W. Hudson, J. C. Low, L. C. L. Murray, P. W. Rowley, and J. I. K. Wood. The result of the aerobatic competition was (1st) R. L. Porteous, (2nd) E. M. Wright, (3rd) D. Berrington, and of the forced landing competition (1st) W. Stern, (2nd) D. Henderson, (3rd) J. Bentley.

LEICESTER

The latest member to obtain his "A" licence, Mr. E. M. Frisby, has beaten the record for the shortest dual instruction previously held by the Secretary, Mr. D. D. Longmore. Last Sunday week the four Club machines flew 22 hr. Miss Julian Brassey, daughter of Sir Leonard Brassey, is the Club's fourth lady pilot.

ATLAS

Machines of Atlas Air Services, Ltd., flew about 127 hr. dual and solo during August, and made a number of special charter flights. New pupils last week were Dr. Niklos, from Hungary, and Mr. Arnott. Abridge aerodrome will commence operations at the end of this week. It is intended to run the Atlas School of Flying and Engineering there, and complete courses for "A" and "B" flying licences and ground engineers' licences will be available.

NORFOLK AND NORWICH

The annual competition for the President's Trophy was held last week-end, the judges being Flt. Lts. L. Banks and H. Martin, from Bircham Newton. The winner was Mr. A. L. Flowerdew, with Mr. H. C. Stringer second, and Mr. F. B. Hall third. Each pilot carried one of the two judges as a passenger. As all the members of the Public Schools Aviation Camp have obtained their licences, their instruction last week was chiefly in cross-country flying and forced landings. Among the week's visitors were M. Legendre in a Caudron from Dieppe, and Wing Cdr. F. Vincent in an Avro Anson from Bircham Newton.

SOUTHEND WEEK-END

THE abnormal aerial activity over the Thames Estuary on Saturday and Sunday was due to the "At Home" of the Southend Flying Club, which was staging some aerial and terrestial entertainment. Southend went one better than most clubs by keeping up its party for two days. The Lympne jamboree, of course, militated against a transcendent gathering of private owners.

The first event promised to be sensational, for the programme read "Arrival Competition. This is in a sealed tin." But "this" turned out to be a document inscribed with the zero hour. Mr. "Tommy" Nash set his Leopard Moth down at a lucky moment and won a cup presented by Mr. A. Seton Bowers, the club's chairman.

Mr. R. Collins deputised for Mr. Robert Kronfeld and showed several perfectly good reasons why people should buy Super Drones.

Messrs. Brian Allen, L. B. Holmes and D. H. Rankin formed a committee, and judged the Moth Major belonging to the Duchess of Bedford to be the winner of the *Concours d'Elégance*. Her Grace had flown this machine to Southend, and subsequently flew it home again, quite alone. Flt. Lt. R. C. Preston, her private pilot, came down later in a Gull. The trophy for the *Concours* was presented by Mr. G. E. Weber, President of the Southend Flying Club.

The Club's Short Scion took off with Mr. Neil Urquhart "up front" and a cabin full of passengers, including Mr. Frederick Coveney. It returned with all but Mr. Coveney, who took his leave over the airport and descended in a dignified manner by courtesy of Mr. Irvin.

F/O. Longfield took up one of the two Genet Major-engined Cadets operated by the club and aerobated happily.

The trophies were presented by the Duchess of Bedford, who was made an honorary member of the club by Mr. Weber, from whom she received an appropriate gold badge.

Subsequent merrymaking was interrupted only for night flying in the Scion to view the famous Southend illuminations.

Came the dawn and a general reassembly, but not precisely at cock-crow, although certain there were who stole away early to Hanworth counting on their wits and skill to wrest eggs and bacon from aviators of those parts.

There was a subsequent forgathering in the Southend Clubhouse for cocktails, and Mr. R. Somerset was in attendance with the Monospar ambulance, which just goes to show how thoroughly they do things at Southend.

Miss Brooks, said to be the only nurse with an "A" licence, passed judgment on the ambulance. The synopsis of her professional opinion seems to have been that it was just what the doctor ordered.

A covey of assorted machines dropped in about mid-day on their way from Lympne. The four German pilots were particularly welcome.

Later in the afternoon Mr. N. J. Bevan made a successful effort in the landing competition, and at eventide the Scion was off once more parading along the scintillating front.

Ramsgate Simple-lifers

ALTHOUGH it is rather in the nature of a first-year experiment, Ramsgate Airport seems to be making a thorough success of its aviation camp. Sixteen-odd enthusiasts (our hyphen is most important!) are sleeping under canvas and spending the daylight hours in exploring Thanet in the airport's Scion, receiving instruction in the Hornet, attending lectures, bathing and making merry generally under the benign headmastership of Flt. Lt. L. R. Mouatt.

It is the present intention of the organisers to keep the camp going until about the 18th of this month. Visitors stay at the camp at the rate of 5 guineas a week, this figure covering trips in the Scion, or 3 guineas plus instruction fees for the Hornet. Full particulars are obtainable from Ramsgate Airport, Ltd., Brettenham House, Lancaster Place, London, W.C.2.

Purely Thermal

ODDLY erratic soaring conditions appear to have greeted the sixty-odd enthusiasts who, with twenty-five sailplanes, congregated at Bradwell Edge, Derbyshire, last week-end for the annual camp and competitions of the B.G.A.

On Saturday evening there was such intense radiation from the sun-warmed hills that even training types of sailplanes were making flights of long duration in the apparently windless dusk. Mr. F. S. Coleman reached 4,000ft. during a 34-minute flight in a Grunau Baby, and Mr. R. Garner achieved 42 minutes in a Dagling while Mr. A. Davies kept a Kirby Cadet up for 34 minutes. It was only the onset of darkness that brought quite a number of people down.

On Sunday a boisterous and chilly wind provided a contrast, but various hardy folk went out, Mr. R. S. Rattray doing best with 1 hour 48 min. on the Cambridge II sailplane. Later in the day the wind approached gale force, and flying ceased.

It is expected that many existing records will go by the board during the course of the week.

The Hélène Boucher Cup

THE second annual competition for the Hélène Boucher Cup, a speed race from Paris (Buc Aerodrome) to Cannes, a distance of about 400 miles, took place last Saturday in perfect weather. The winner was Maryse Hilz, who covered the distance in the phenomenal time of 1 hr. 52 min. 43 sec. at an average speed of 234 m.p.h.

Entry was limited to women pilots, and the cylinder displacement of the engine was restricted to 9½ litres (550 cu. ins.). Six machines took part.

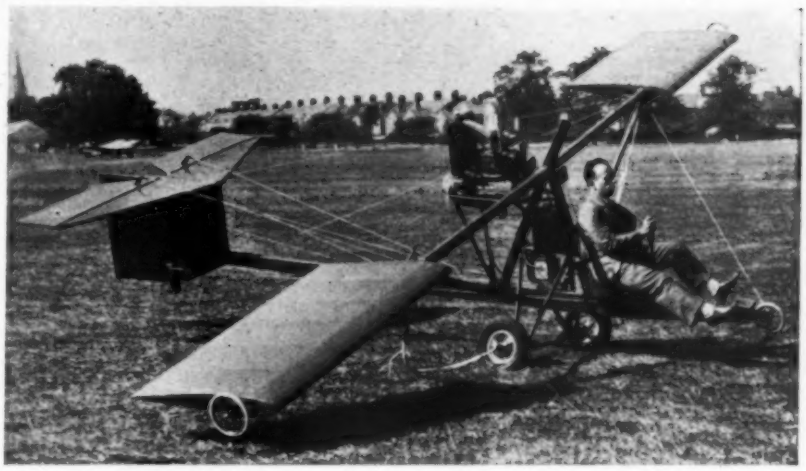
Mlle. Hilz piloted a Caudron cantilever monoplane of a new type, known as the C.680-5, and fitted with a Renault 220 h.p. six-cylinder, in-line, inverted, air-cooled engine, moderately supercharged and fitted with a Ratier variable-pitch air screw.

AN INSTRUCTIVE KIWI

The Kronfeld Ground Trainer : Economy for Clubs

VERY considerable reductions in the time devoted to elementary dual instruction are visualised by Mr. Robert Kronfeld, the designer of the Kronfeld Ground Trainer which emerged from the works of Kronfeld, Ltd. a few days ago and went purring across the aerodrome with its tail in the air, banking and turning, but always in contact with the Hanworth sward.

The object in producing this apparatus was to provide a means whereby a pupil could familiarise himself with the workings and feel of a conventional set of controls in perfect safety and at trifling cost. The prototype has been bought by Mr. Lindsay Everard, M.P., and will be used by the Leicestershire *Pou* Club, which already operates a Drone.



Mr. Kronfeld illustrates how the lateral control of his new ground trainer can be used with impunity. (*Flight* photograph.)

Arranged as a pusher, the new ground trainer seems sufficiently sturdy to defy any abuse to which it is likely to be subjected. The pupil is seated in front of what would be, were the machine fitted with wings, the leading edge. He has a special throttle control, the effectiveness of which can be increased with his proficiency, permitting taxi-ing up to about 50 m.p.h.

The undercarriage is situated close to the C.G., and from

The "core" of the Kronfeld ground trainer, showing the installation of, and the feeding arrangements for, the converted Ford engine. (*Flight* photograph.)

it to the "wings" is stretched a rubber cable. As the pupil becomes increasingly confident the tension on the cable is released, making it necessary for him to use his ailerons in order to keep a wing from dropping. Should he apply too much elevator, a wheel in the nose prevents the machine from overturning. There are wheels also at the wing tips to prevent similar accidents through over-enthusiastic use of the lateral control.

The fuselage is a length of spruce measuring 6in. by 2in., tapering off at the front and rear. About a third of the way back from the nose is the pilot's seat with the undercarriage beneath. The undercarriage is of steel tube and has a track of 4ft. 6in. Resting on the main axle are tubes which carry the wheels. These are free to move up and down so that by wrapping rubber cord around them a simple shock-absorber is made. Directly above the undercarriage are two substantial steel tubes in the form of an inverted vee which support the "wings" and engine. The engine mounting takes the form of two rails of one-inch diameter tube welded on to the main vee struts and supported by two more struts bolted to the main boom or fuselage.

A modified Ford engine is used, giving 30 h.p. and driving an airscrew 4ft. in diameter.

The control column is mounted on a torque tube which runs back to the front of the main vee struts where a "bloater" is welded on, the cables running upward and over two pulleys out to the ailerons. Each aileron is slipped over a long tube of 3in. diameter which forms the "wing spar." At the front end of the main-torque tube is a pulley for the elevator controls, one end travelling down to the elevator through the tube.

Simple wooden construction with fabric covering is used for the tail units, the tail plane being braced by one-inch streamline tubes. The anti-drag wires for the wing are fixed to the front tail plane attachments, and the drag wires are connected to the nose wheel fittings. It is possible to fold the "wing" by detaching the drag wires.

Mr. Kronfeld is working out a suggested routine to be followed during instruction. First of all he contemplates placing the machine with the axle against a stake, opening the throttle so that the slipstream lifts the tail and permitting the "feel" of the elevators. Next, instruction would be given in the use of the ailerons and then slow taxi-ing would be permitted to teach the use of the rudder. After that there would be exercises in combinations of two controls, and finally the pupil would be permitted to taxi at full throttle with all the controls in operation. It might be advantageous to mark out S turns on the instructional field for the pupil to follow.

The price, with Ford engine, will be £195.

Egyptians Entertained

MEMBERS of the Egyptian Delegation in England for the signing of the Anglo-Egyptian Treaty paid a visit last Friday to Hawkers' flying sheds at Brooklands. They were favoured with good weather—which even they agreed was hot—and spent an interested hour and a half looking over machines in various stages of erection and an excellent flying demonstration by Mr. P. G. Lucas on the works Fury G-EBSE, which is used mostly for experimental purposes. After the show, lunch was taken at the St. George's Hill Golf Club, which boasts one of the finest outlooks in southern England.

A photograph of members of the party appears on page 257.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

NOMENCLATURE OF AIRCRAFT

The designation Whitley I is to be restricted to aeroplanes fitted with Tiger IX engines. Certain Whitley aeroplanes now in construction will be adapted to take another mark of Tiger engine, the mark number of which will be announced later. This later form of Whitley will be known as the Whitley II.

EXPLOSIVES COURSE

The undermentioned officers, having successfully completed the Explosives Course held at No. 2 Stores (Ammunition) Depôt, Altrincham, which terminated on July 11, are granted the symbol "X":—F/O.s E. J. Smith and A. H. McM. Hely.

SPECIALIST ENGINEERING COURSE

The undermentioned officers, having successfully completed the specialist "E" course at Henlow which terminated in July, 1936, are granted the symbol "E":—Flt. Lts. B. A. Casey, R. T. Cazalet, T. N. Coslett, J. M. Freeman, R. B. Harrison, A. L. Holland, W. H. Husbands, J. J. Murphy, W. S. Reed, C. G. Skinner, C. H. Smith, N. C. Walker, K. R. Warton, F/O. R. G. Bowditch.

The following officer has been selected to attend the Torpedo course on H.M.S. *Vernon* which commences on September 7:—Flt. Lt. N. C. Walker.

CENTRAL FLYING SCHOOL CATEGORIES

The undermentioned officers and airmen pilots who attended the Flying Instructors Course at the Central Flying School from 27.4.36 to 12.7.36 have been categorised as follow:—

A.2

Flt. Lt. R. H. A. Leigh, F/O.s J. R. A. Peel and P. S. Salter.

B

Flt. Lts. R. C. M. Collard, J. W. A. Hunnard, A. W. S. Matheson, R. G. S. Morgan Smith, D. M. Somerville, and J. N. H. Whitworth; F/O.s H. G. L. Allsop, H. D. U. Denison, J. F. H. Du Boulay, E. P. P. Gibbs, A. F. Hamilton, M. Hastings, H. J. Kirkpatrick, D. G. Lewis, I. J. McGhie, D. P. McKeown, J. S. McLean, V. E. Maxwell, and D. S. Radford; Flt. Sergt. Wallington, W. F.; Sergts. Hall, A. G., Hubbard, J. L., James, G. T., Jones, W. F., Landrey, F., Ledger, H., Monk, J. W., Oldfield, E. C., Paddon, F. W. J., and Varley, J. D.

C

F/O.s G. J. Grindell, J. H. R. Oldfield, and J. W. Young, Sergt. Woode, A. L.

No. 7 FLYING TRAINING SCHOOL

The undermentioned officers have been awarded special assessments as shown hereunder, on completion of a course of flying training at No. 7 Flying Training School, Peterborough:—

Distinguished Pass

A.P/O.s R. D. B. MacFadden and J. P. M. Woolley.

No. 11 FLYING TRAINING SCHOOL

The undermentioned officers have been awarded special assessments as shown hereunder on completion of a course of flying training at No. 11 Flying Training School, Wittering:—

Special Distinction

A.P/O. M. W. B. Knight.

Distinguished Pass

A.P/O.s C. E. Drapper and P. H. Rebbeck.

ROYAL AIR FORCE CLUB

The Royal Air Force Club is closed for repairs and redecoration from 12 noon on Tuesday, September 1, until 12 noon on Thursday, October 1. Members will be the guests of the following clubs:—Cavalry Club, Junior Naval and Military Club, and Connaught Club.

R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee was held at Iddesleigh House on Monday, August 24. Mr. W. S. Field was in the chair. The Committee made grants to the amount of £233 10s. 6d. The next meeting was fixed for September 7.

R.A.F. STAFF COLLEGE DINNER CLUB

The twelfth annual reunion dinner of the R.A.F. Staff College Dinner Club will be held at the May Fair Hotel (entrance in Berkeley Street, W.1) on Friday, October 2, at 7.30 p.m. for 8 p.m. Air Marshal P. B. Joubert de la Ferté, C.B., C.M.G., D.S.O., will be in the chair. Evening dress (tail coat, no miniatures) will be worn. The charge for the dinner will be 16s. This charge will include cocktails and port, and cover the cost of gratuities and other incidental expenses. The string band of the Royal Air Force will play selections of music during dinner. Officers intending to be present are requested to forward a cheque for 16s., as soon as possible, to the Honorary Secretary, R.A.F. Staff College Dinner Club, Andover, Hants. Cheques should be made payable to the honorary secretary and crossed "Dinner Club a/c."

FORMATION FLYING—ORDER OF LANDING

It has been found that, when a formation breaks up before landing, there is some confusion and consequent risk of collision unless the order in which the respective sub-formations or individual aircraft are to land has been previously arranged.

It has therefore been decided to lay down as standard practice that, unless specific orders to the contrary have been given by the formation leader, formations approaching an aerodrome at which it is intended to break formation before landing, are to form echelon to the right before entering the circuit zone. Sub-formations are to land in the sequence of their disposition in echelon. Unless contrary instructions have been given, each sub-formation on breaking off to land is itself to form echelon to the right, and ultimately individual aircraft are to land in the sequence of their position in the flight echelon formation.

ONE THOUSAND BOYS WANTED

The Air Ministry announces:—

The expansion of the Royal Air Force continues to require the entry of well-educated boys in large numbers, and more than a thousand will be entered early in the New Year; of these approximately 800 will be needed in January for training as aircraft apprentices, and 250 in February as boy entrants. No previous trade experience will be necessary. Applicants for apprenticeships must be at least fifteen but under seventeen years of age on January 1, 1937, and for entry as boy entrants between fifteen years nine months and seventeen years three months on February 1, 1937.

Full particulars of both schemes (A.M. Pamphlet 15 and A.M. Pamphlet 54 respectively) may be obtained from the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.

Four of the most highly skilled trades (with the highest rates of pay) in the Royal Air Force are open to aircraft apprentices, who are given three years' thorough training at a technical school before being posted to units. These trades are fitter, fitter (armourer), wireless operator mechanic, and instrument maker. The trades open to boy entrants are also of great importance, viz., armourer, photographer and wireless operator, and a sound training is given.

A competitive examination for apprentices will be conducted at numerous local centres on November 3, 1936, the subjects being Mathematics, English and General Knowledge, and Science. The closing date for the receipt of nominations for this examination is Tuesday, October 6, 1936. Applicants possessing an approved first school certificate, with passes in Mathematics and a specified Science subject, may be excused the examination. Candidates sitting at the examination for whom apprenticeships are not available may, if of suitable age and educational attainment, be offered enlistment as boy entrants. Boys may also be nominated for direct enlistment as boy entrants without undergoing the examination.

Aircraft apprentices and boy entrants are housed, fed, clothed and medically attended free of cost. The training is in the hands of well-qualified technical instructors, and boys entering as apprentices continue their general education throughout the apprenticeship period under a staff of graduate teachers.

ROYAL AIR FORCE GAZETTE

London Gazette, August 25, 1936

General Duties Branch

The following Pilot Officers on probation are confirmed in rank:—D. Nolan-Neylan (July 31); A. G. F. Cuningham (June 6).

The following Acting Pilot Officers on probation are confirmed in rank and graded as Pilot Officers on the dates stated:—D. E. C. Eyres, J. A. Field, J. H. L. Graham, M. W. Hamlyn, J. R. Henderson, L. Maxwell-Muller, G. M. Roddy, W. Simpson, C. B. B. Wallis (June 12); P. White (June 14).

The following Acting Pilot Officers on probation are graded as Pilot Officers on probation on the dates stated:—H. W. Bolingbroke, H. F. Bromwich (April 20); E. Graham, D. S. Macdonald, J. A. Richards (April 24); M. H. T. Cooke (May 8).

Flt. Lt. C. E. St. J. Beamish is placed on the half pay Est, Scale B (August 12).

ROYAL AIR FORCE RESERVE

General Duties Branch

The following Flying Officers are transferred from Class A to Class C (August 24):—R. A. Beynon, D. L. Dustin.

F/O. C. M. Dransfield is transferred from Class C to Class DD (Medical) (July 21).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders.—G. L. Carter, A.F.C., to Superintendent of the Reserve, Hendon, 17.8.36; for flying (flying instructor) duties vice Sqn. Ldr. W. H. Poole, A.F.C., M.M. R. Menzies, to Headquarters, Bomber Command, Uxbridge, 8.8.36; for Signals duties.

Flight Lieutenants.—J. N. Jefferson, to Central Flying School, Upavon, 17.8.36. H. W. Mermagen, to Central Flying School, Upavon, 12.8.36. L. S. Snaith, A.F.C., to Royal Air Force College, Cranwell, 17.8.36. G. D. Stephenson, to Central Flying School, Upavon, 12.8.36. P. W. M. Wright, to No. 34 (B) Squadron, Abbotsinch, 1.8.36.

Flying Officers.—W. F. Beckwith, to Headquarters, No. 3 (Bomber) Group, Andover, 27.7.36.

Acting Pilot Officers.—The following Acting Pilot Officers are Posted to their respective units on 10.8.36:—F. Aikens, to No. 10 (B) Squadron, Boscombe Down. A. Aitken, to No. 99 (B) Squadron, Mildenhall. L. Aitken, to School of Army Co-operation, Old Sarum. D. J. Bassett, to No. 98 (B) Squadron, Abingdon. P. R. Beare, to No. 102 (B) Squadron, Worthy Down. H. R. P. Bridgen, to No. 40 (B) Squadron, Abingdon. M. F. C. Farrar, to School of Air Navigation, Manston. A. S. Forbes, to School of Army Co-operation, Old Sarum. J. H. Grant, to School of Army Co-operation, Old Sarum. I. D. Grant-Crawford, to No. 49 (B) Squadron, Worthy Down. A. B. Greenaway, to No. 23 (F) Squadron, Biggin Hill. D. H. Holmes, to School of Army Co-operation, Old Sarum. A. N. Jones, to No. 65 (F) Squadron, Hornchurch. K. V. Keen, to No. 17 (F) Squadron, Whyteleafe. C. J. F. Kydd, to No. 9 (B) Squadron, Aldergrove. R. H. Lonsdale, to No. 25 (F) Squadron, Hawkinge. A. R. Putt, to No. 65 (F) Squadron, Hornchurch. G. L. Raphael, to No. 7 (B) Squadron, Worthy Down. F. C. Rivers, to No. 10 (B) Squadron, Boscombe Down. J. A. Roncoroni, to No. 57 (B) Squadron, Upper Heyford. J. G. Sanders, to No. 111 (F) Squadron, Northolt. A. L. H. Solano, to No. 40 (B) Squadron, Abingdon. C. R. D. Stewart, to No. 19 (F) Squadron, Duxford. R. N. Stidolph, to No. 34 (B) Squadron, Abbotsinch. W. N. Sykes, to No. 23 (F) Squadron, Biggin Hill. T. E. Syms, to No. 18 (B) Squadron, Bircham Newton. F. E. Williams, to No. 57 (B) Squadron, Upper Heyford.

Stores Branch

Flying Officer.—K. D. Stanion, to No. 8 Flying Training School, Montrose, 10.8.36.

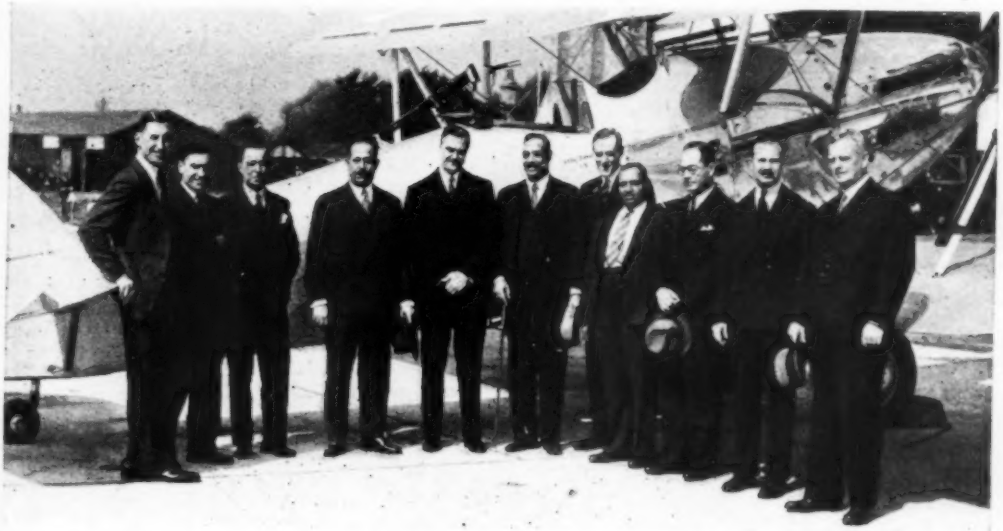
Pilot Officers.—B. O. Cannon, to R.A.F. Station, Manston, 10.8.36. R. F. Folley, to Marine Aircraft Experimental Establishment, Felixstowe, 10.8.36. J. E. Garwood, to R.A.F. Station, Upper Heyford, 10.8.36. D. H. M. Graham, to No. 13 (Army Co-operation) Squadron, Old Sarum, 10.8.36. L. A. Jackson, to R.A.F. Station, Gosport, 10.8.36. N. V. Lindemere, to No. 1 Stores Depot, Kidbrooke, 10.8.36. F. G. Metcalfe, to R.A.F. Station, Abbotsinch, 10.8.36. P. H. Stibbs, to No. 4 Stores Depot, Ruislip, 10.8.36.

Medical Branch

Flying Officers.—J. C. Bowe, to R.A.F. Depot, Uxbridge, 18.8.36. H. D. Conway, to R.A.F. Station, Abingdon, 19.8.36. R. F. Courtin, to R.A.F. Station, Manston, 18.8.36. E. W. R. Fairley, to Central Flying School, Upavon, 18.8.36. S. G. Gordon, to No. 7 Flying Training School, Peterborough, 18.8.36. E. B. Harvey, to R.A.F. Station, Wyton, 19.8.36. J. R. R. Jenkins, to No. 5 Flying Training School, Sealand, 18.8.36. V. D. Jones, to No. 3 Flying Training School, Grantham, 18.8.36. D. S. M. MacArthur, to R.A.F. Station, Andover, 19.8.36. I. K. Mackenzie, to R.A.F. Station, Driffield, 19.8.36. E. J. Moynahan, to Medical Training Depot, Halton, 20.8.36. J. H. Neal, to No. 1 Flying Training School, Leuchars, 18.8.36. R. C. O'Grady, to No. 11 Flying Training School, Wittering, 18.8.36. R. M. Outfin, to No. 6 Flying Training School, Netheravon, 18.8.36. R. H. Pratt, to Home Aircraft Depot, Henlow, 18.8.36. J. G. Rountree, to No. 10 Flying Training School, Ternhill, 18.8.36. D. J. Sheehan, to R.A.F. Station, Finningley, 19.8.36. D. G. Smith, to No. 9 Flying Training School, Thornaby, 18.8.36. F. L. Whitehead, to No 9 Flying Training School, Thornaby, 18.8.36.

Chaplains Branch

Rev. C. D. Fay, to R.A.F. Depot, Uxbridge, 1.8.36, for duty as Chaplain (Roman Catholic).



ANGLO-EGYPTIAN : Members of the Egyptian Treaty Delegation—who, as related on page 255, visited Brooklands last week—seen with members of the Hawker organisation. Left to right : Messrs. P. E. G. Sayer and P. G. Lucas (test pilots), Ahmed Ragheb Bey, His Excellency Mahmoud Fahm-el-Nokrashy Pasha, R. L. Sutton (director), His Excellency Mohammed Hilmy Issa Pasha, Major E. N. S. Crankshaw, C.M.G., M.B.E. (secretary, Government Hospitality Department), Abdulla Hassein (Akram), Fuad Sarruf (Mokattam), P. A. Somers Cocks, C.M.G. (Foreign Office), F. I. Bennett (director). (*Flight* photograph.)

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns

VITAL PEACE

I CANNOT, for the life of me, see why Mr. Wickham Steed, or, by inference, the writer of *Flight's* review of his book, *Vital Peace*, should display the "greatest contempt" for pacifists.

Nobody but a homicidal maniac wants war and, therefore, everyone who is not a homicidal maniac is necessarily a pacifist. The word has no other meaning, and to impute cowardice, false idealism and lack of backbone from the word, as applied to a person, is to take an unjustifiable liberty with the English language.

Pacifists may be divided into three broad groups: The morally courageous peace-at-any-price brethren; those who believe that an international (and unbiased) police force is a necessity if trouble is to be prevented; and those who pin their faith to medieval or Chicago-ean bodyguards on the principle that might is always right.

I will make no attempt to prove that, in the present state of human stupidity, any one of the three groups is on the right track, but only the last method has been tried—and with no marked success.

RATIONALIST.

London, S.W.3.

[It would appear that our correspondent has not read *Vital Peace*. If he had he would see that Mr. Wickham Steed, while possibly taking an "unjustifiable liberty" with the English language, evidently does not regard everyone who is not a homicidal maniac as a pacifist; and, in fact, the distinction between peace-lovers and pacifists is generally accepted. Mr. Wickham Steed is undoubtedly an intense lover of peace; so is *Flight*; but neither is a pacifist in the usual meaning of the term.—ED.]

"AN AIRLINE AT LAW"

I HAVE read with interest the comments on the cases of Grein *v.* Imperial Airways, and the Westminster Bank *v.* Imperial Airways as contained in your article of last week under the above heading.

I do not propose to comment at all on the report of the latter case, which is already *sub judice* in the Court of Appeal, nor do I propose to discuss the correctness or otherwise of the findings of the Court of Appeal in the former case. It seems to me, however, that the barrister who contributed your article is not only unfair to Imperial Airways, but may be dangerously misleading to air carriers generally by reason of certain inaccuracies which have crept into his report.

In the first place a careful reading of the majority judgment of the Court of Appeal in the case of Grein *v.* Imperial Airways seems to show clearly that it was only by reason of the finding that the carriage was "international" that the claimants were entitled to recover anything at all, the judgment expressly stating that had the carriage not been governed by the Carriage by Air Act a claim under Lord Campbell's Act would have been barred by the Conditions of Carriage.

In the second place, the commentator's suggestion that air carriers should "embody the [Warsaw] Convention in their passenger and luggage tickets and air consignment notes rather than attempt to improve upon the Convention in such contracts" is an extremely dangerous one. It was an attempt to embody the Warsaw Convention rules of liability in their contract of carriage which involved Imperial Airways in a judgment for £4 000 against them in the Court of First Instance. Moreover, anyone who takes the trouble to read the Warsaw Convention, and to consider it in the light of the requirements of a contract of carriage which may, or may not, be governed by the Convention, will soon realise that it is impracticable for an air carrier simply to adopt the Convention as it stands without any additions.

What the International Air Traffic Association did would seem to be the sensible course to adopt; namely, they prepared draft tickets and consignment notes based upon the Warsaw Convention, but adapted for general use and incorporating such additional conditions as were necessary, and then submited it to the draftsmen of the Convention for approval. Having obtained this approval they proceeded to put the forms into use. Experience in the Courts has shown that, in seeking voluntarily to accept a basis of liability which had been approved by the Governments of all the principal civilised countries, they were, in fact, laying themselves open to risks which they failed to appreciate, but no fair-minded man could blame them for the course which they adopted.

The position would seem to be that the Warsaw Convention is a mixed blessing from the point of view of air carriers and air passengers alike until such time as it is universally ratified by all the signatories. Meanwhile the immediate moral to be drawn from the cases referred to would seem to be that our own Government can help to remove the anomalies by exercising its powers under the Carriage by Air Act, 1932, and applying the rules of the Convention, with such amendments as have been proved desirable by experience, to national, as well as international, carriage.

Until this happens, or until the decision in Nunan *v.* the Southern Railway Company is overruled by the House of Lords, air carriers would seem to be compelled in self-defence to accept the principles of the Warsaw Convention only in respect of carriage governed by that Convention, and to contract out of all liability, as they are entitled to do, in other cases.

SOLICITOR.

POP RIVETING

WE have read with interest the letter over the signature of Mr. R. Ruddock of the Geo. Tucker Eyelet Co., Ltd., Birmingham, in reference to the pop riveting system. We note the claims made by your correspondent in regard to his particular system of riveting as compared with the Chobert system, which was recently fully described in your pages, and we refrain from making comments or comparisons which are well known to the users of both systems.

We would, however, definitely contradict the claim that it is possible for a juvenile operator to place 1,200 rivets an hour by the system referred to by your correspondent, and in order that this important point may once and for all be settled to everybody's satisfaction we are prepared to enter into a competition with this or any other system to be adjudged by a competent referee, in order to prove that, irrespective of the comparative costs of the Chobert rivets on the one hand and the combined rivet and mandrel on the other hand, the total cost of the completed job done by the Chobert system will be considerably less, and it will be executed very much more quickly.

Perhaps, therefore, your correspondent will be prepared to accept and take up our challenge.

AVIATION DEVELOPMENTS, LTD.,
London, N.W.1. Stanley T. Johnson.

WITH A STRING TO IT

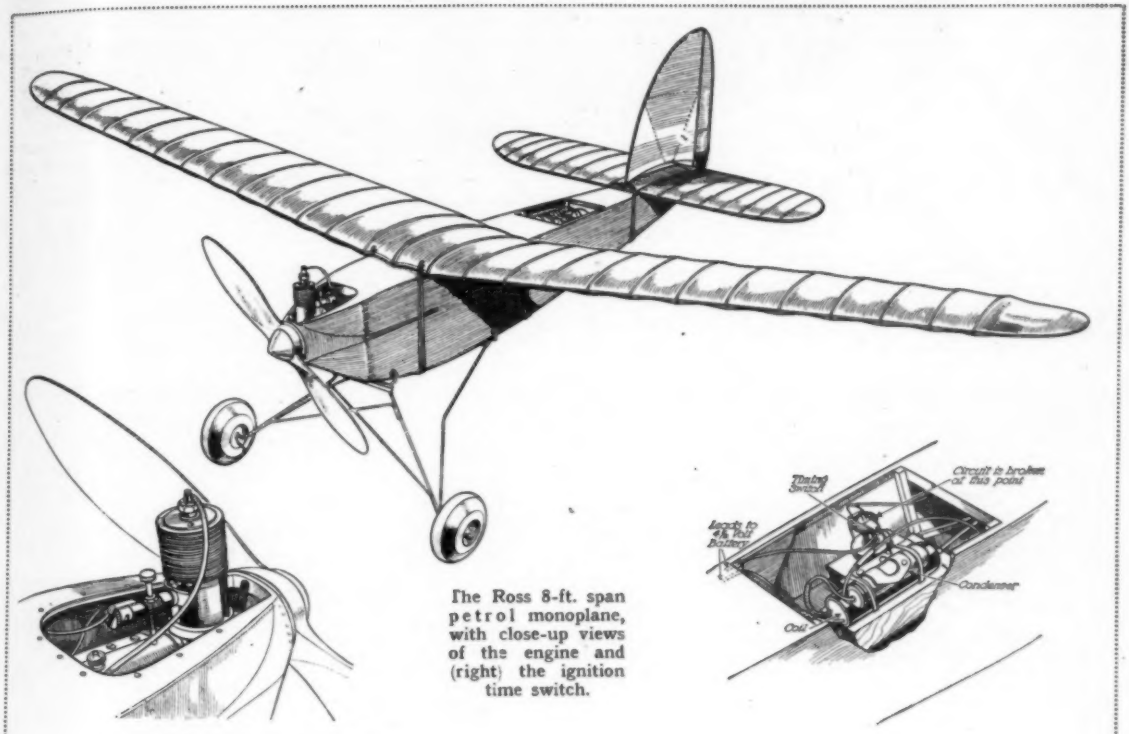
AT about 19.00 hours yesterday (27/8/36), there flew from the direction of Kentish Town, over Hampstead, a pale buff coloured, low-wing monoplane, which had the appearance of one of the Miles cabin types, according to a glimpse I had of it through a tree. It may be of interest to the pilot, if this should catch his eye, to know (a) that he was too low for his own safety and flying inconsiderately as regards the feelings of those on the ground, and (b) that he flew beneath the strings of two large kites which were being flown from Parliament Hill, and which (having inspected that sort of kite-flying at close quarters), one can safely say would more probably have killed him than not, if he had touched them. Incidentally, I wonder who would be responsible in law for the damage to the ground, to the kite, and to the aircraft, respectively, in such a case?

W. E. P. JOHNSON.

London, W.C.2.

The Whole Works

ANYONE who wants to learn in not-too-minute detail how the modern aeroplane and its engine is built and why and how it works can hardly do better than get a copy of *The Airplane and its Engine*. Although the joint authors are American and in consequence the terminology is apt to differ somewhat from that in current English use, everything is readily understood. Every effort has been made to introduce nothing which requires more than an elementary knowledge of physics and mathematics to make its meaning clear. The price is 18s. and the publishers are the McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2.



The Ross 8-ft. span petrol monoplane, with close-up views of the engine and (right) the ignition time switch.

MODELS

By M. R. KNIGHT

Petrol Power at Heath Row

BAD weather marred the Sir John Shelley Cup Contest for power-driven models, which was disappointing in view of the progressive nature of this year's rules. A postponement due to impossible conditions eliminated several experienced entrants who were going on holiday. Then, on August 2, a wind of over 30 miles an hour, and gusting up to nearly 50, further reduced the field.

The rules aimed at safety and controllability. Models were required to make two flights of one minute each, the first to include at least one left-hand turn, and the second a complete right-hand turn. A duration below or above one minute, and any straying outside the aerodrome boundary, involved loss of points. The Cup was awarded to Mr. E. Ross (Northern Heights Model Flying Club), who received 20 points for a magnificent flight of precisely 60 seconds, circling to the left. A right-hand turn was not completed. Take-off, height, steadiness, glide and landing were all exemplary, despite the wind and the fact that a previous encounter with a tree had fractured the top wing spar. The machine is described and illustrated on this page.

Mr. A. E. Brooks, of Leicester, though failing to complete the required turns, flew most creditably with the high-wing *Comet*, based on the model which last year flew 35 miles from Cranborne Chase, and was found in the sea off the Isle of Wight. It has a split wing of 7 ft. span and 14 in. chord, a 4ft. fuselage, and is built of spruce, covered with doped silk. The lines are clean and pleasing. The efficient and reliable 18 c.c. Comet engine, of which Mr. Brooks is the designer, is mounted on a detachable nose-piece, thereby facilitating change of engine, and lessening risk of damage in the event of a crash.

Both this model and a similar machine with 15 c.c. Merlin Comet engine, flown by Mr. E. H. Wilson, were admired for their fast climb and wind-fighting abilities. The wind claimed a victim in the strut-braced high-wing monoplane flown by Mr. F. Harris.

Mr. B. K. Johnson, chairman of the S.M.A.E., though not competing, effectively demonstrated one of his characteristic deep-bodied high-wing models.

The Ross Monoplane

THOUGH the model with which Mr. E. Ross won the Sir John Shelley Cup was designed for maximum flying performance rather than appearance, it excels in both respects. Constructed of spruce and balsa wood, it has a wing span of 8 ft., an overall length of 4 ft., and an all-up weight of $3\frac{3}{4}$ lb.

The wing is in two parts, which plug together, the section being similar to Clark Y, but $1\frac{1}{2}$ times the depth. It has an area of 8 sq. ft., the skilled simplicity of structure securing the low loading of $7\frac{1}{2}$ oz./sq. ft. The chord tapers from 14 in. to 10 in. There is a rectangular spar at the top of the camber, but sunk sufficiently to clear the contour of the silk covering. At the bottom there are two T-spars, which, though slightly flexible, were able to support the machine in the power contest without the aid of the top spar.

The fuselage has $\frac{3}{16}$ in. × $\frac{3}{16}$ in. strutting in place of plywood bulkheads. Coil, condenser, 4½-volt flat-type battery, and timing device are mounted on a platform behind the wing, and are easily accessible through a trap door. The nose is faired with $\frac{1}{32}$ in. plywood, which effectively cowls the engine without affecting the cooling. The tail-plane is 36 in. in span, 10 in. in chord, and has a lifting section. Constructionally it resembles the wing. The fin area is one-third that of the tail-plane. The fine finish of the model is attained with two coats of Cellon clear dope and two coats of aluminium over the Jap silk covering. The undercarriage has a track of 16 in.

This is the third model in which the particular Brown Junior 9 c.c. two-stroke has been mounted, and after 100 hours it shows no signs of wear. The ability to fire evenly at anything from 900 to 6,000 r.p.m. has materially contributed to the success of numerous trial flights. The timing arrangements consist of a Kodak self-timer of the pneumatic plunger type. A spring-loaded plunger moves outward, and control is effected by the quantity of air passing through a lock into the partial vacuum below the plunger. On the latter reaching its highest point it automatically breaks the ignition circuit.

The model won second place in the *Concours d'Elégance* at the Northern Heights 1936 Gala Day, which was the occasion of its first appearance. Subsequently it made numerous fine flights, keeping within the aerodrome, until jammed timing arrangements resulted in a six-minute flight and a landing in a quarry. The outstanding features are stability, height, and exceptionally slow, flat glides. (*Concluded overleaf*)

The National Cup

THIRTY modellists, representative of fourteen clubs, competed on August 2 for the National Cup. It was won by Mr. R. Copland (Northern Heights M.F.C.), a member of the victorious British Wakefield team, who averaged 95.3 sec. on three R.O.G. flights. Mr. H. Simmonds (Blackheath M.F.C.) averaged 87.73, and Mr. C. W. Needham (Bristol W.M.F.C.) 84.13.

Autogiro Progress

COMPARATIVELY few modellists care to tackle that toughest of propositions, the model autogiro. Consequently entries were scarce for the S.M.A.E. Autogiro Contest on August 23, but the results indicated progress. For the first time, rise-off-ground flights were stipulated.

Mr. S. R. Crow (Blackheath M.F.C.) won with an average on three flights of 35.36 sec. His best flight, 39.03 sec., established a new R.O.G. record, while just prior to the contest, he raised the hand-launched record to 49.45 sec., both subject to confirmation. His model differs from the 1935 type in having a cambered tail-plane set at a large positive angle, upturned tips, and the rotor blades mounted without incidence, the tips being steamed to a negative angle. It reached a height of about 80ft. flying strongly, the only point calling for further experiment being a slight stalling tendency when the power ceased.

Mr. E. Ross (Northern Heights M.F.C.) lost the contest by three seconds, and the R.O.G. record by a fraction! He averaged 32.4 sec., his best attempt being 39 sec. The model climbed to over 100ft., and flew steadily under power and during the descent. It differed from the winner's machine in having a flat tail-plane set at a slight positive angle, and the rotor blades, which were made detachable by plugging into celluloid tubing, mounted negative to their axis.

Mr. L. Mawby, of Ealing, averaged 16.3 sec., his best effort of 18.1 being slightly less than the record he established last year. The rotor blades of his machine are tapered in plan form.

A Practical Book

THE literary ability of Mr. L. H. Sparey blends effectively with the technical skill of Mr. C. A. Rippon in *The New Model Aeroplane Manual* (Percival Marshall and Co., Ltd., 3s.). It is a little difficult to review a book to which one has contributed a chapter, but leaving that item out of account, the book is, in the writer's opinion, the best text-book of model aeronautics yet published. A lucid explanation of principles is followed by chapters on component parts, types of models, covering and doping, etc., different ideas and methods being explained with entire freedom from bias. There are also full descriptions of six representative models, including one for beginners, a duration type, a petrol-engined monoplane, and a Hornet Moth. Concise, comprehensive and eminently readable, the book should prove highly popular.

* * *

A most realistic "Skybird" model of Gatwick Airport will be on view at British Industries House, Oxford Street, London, W.1, from next Monday onwards.

* * *

A 32½in. span Hornet Moth kit is among the latest flying scale model outfits marketed by Premier Aeromodel Supplies, 2a, Hornsey Rise, London, N.19.

* * *

Divided into two sections, for those under and over sixteen respectively, a comprehensive constructional competition, with some handsome prizes, is being organised for purchasers of Hamley's kits. Full details are obtainable from the Aviation Dept., Hamley's, Ltd., 200-202, Regent Street, London, W.1.

Forthcoming Competitions

September 5.—Seaplane contest, Liverpool M.A.S.
September 6.—Biplane contest, on grounds of clubs affiliated to S.M.A.E.
September 17-26.—"Model Engineer" Exhibition, Old Horticultural Hall. Aeronautical exhibits by R.A.F., Halton, S.M.A.E., T.M.A.C., and Northern Heights M.F.C.
September 19.—Duration contest, Liverpool M.A.S.
September 26.—Handicap Duration contest, Liverpool M.A.S.

THE INDUSTRY

Rolls-Royce Chairman

AT a meeting of the directors of Rolls-Royce, Ltd., last week, Lord Herbert Scott was elected chairman of the board in succession to the late Rt. Hon. Lord Wargrave, P.C. Lord Herbert Scott has been a director of the company since 1907.

Parnall Aircraft Issue

THE directors of Parnall Aircraft, Ltd., announce that shareholders have exercised their rights on the new issue of 600,000 shares of 5s. each at 5s. 6d. a share to the extent of approximately 98 per cent. Excess shares applied for exceeded the total of the whole issue, but as the balance available is only 2 per cent., the allotment on the excess application forms has accordingly been very small, and has been limited to applicants whose holdings are not less than 200 shares. Allotment letters and letters of regret have been posted.

Titanine Progress

FACTORY extensions at the Colindale Works of Titanine, Ltd., which have been in progress since the beginning of this year, are now practically completed, stated Mr. T. W. H. Ward (chairman) at the statutory meeting held in London last week.

The company's turnover, Mr Ward declared, has been increased and is being maintained at a high level, and the new buildings would be kept fully occupied with the increased business which is being handled. The aircraft side was likely to be busy for some years to come, but apart from this trade the company is now paying particular attention to developing the sale of cellulose and synthetic lacquers for many industrial purposes.

Mr. Ward said he had every reason to suppose that the earnings of the company would prove to be at a rate in excess of those earned during the corresponding period of last year by Titanine-Emaillite, Ltd., whose assets and business the company took over at its formation.

About Technical Works

THOSE who have frequent recourse to technical books should find a service offered by the Phœnix Book Co., Ltd., of considerable utility. This concern keeps a detailed register of technical works on all subjects as they appear and, in connection with the supply of such books, has a long-credit system. A catalogue and full details is obtainable from the company at 66, Chandos Street, Strand, London, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.).

(*Published September* 3, 1936.)

25416. GRAY, A., and GRAY, E. R.: Gyroscopic apparatus (451,337).
34528. PAULSEN, J. F., and STRACHOVSKY, N.: Flexible mountings for aircraft engines (451,577).
7364. ELLIOTT, A. G., RUBBRA, A. A., and FAIRHURST, L. G.: Variable-pitch airscrews (451,518).
7438. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and OWNER, F. M.: Variable-pitch airscrews for aircraft (451,520).
9011. BRISTOL AEROPLANE CO., LTD., and FEDDEN, A. H. R.: Cooling arrangements for radial-cylinder internal-combustion engines for aircraft (451,286).
14859. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and MAYER, F.: Cowlings for air-cooled internal-combustion engines for aircraft (451,525).
29764. VEREINIGTE DEUTSCHE METALLWERKE AKT.-GES. ZWEIGNIEDERLASSUNG HEDDERNHEIMER KUPFERWERKE: Means for securing nosings on the hubs of airscrews (451,553).
28625. LUMIERE, H.: Supporting surfaces of aeroplanes (451,469).
6932. ELLIOTT, A. G., RUBBRA, A. A., and FAIRHURST, L. G.: Variable-pitch airscrews (451,647).
6933. ELLIOTT, A. G., RUBBRA, A. A., and FAIRHURST, L. G.: Variable-pitch airscrews (451,648).

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda. No. 1685: Effect of Variation of Aileron Inertia and Damping on Flexural-Aileron Flutter of a Typical Cantilever Wing, by V. M. Falkner. Price 1s. No. 1693: Air and Vapour Locks in Fuel Systems, by M. A. A. Allfrey. Price 1s. 3d. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Practical Stereoscopic Photography, by Moir J. Dalzell. Price 10s. 6d. The Technical Press Ltd., 5, Ave Maria Lane, London, E.C.4.

The New Model Aeroplane Manual, by L. H. Sparey and C. A. Rippon. Price 3s. Percival Marshall and Co., Ltd., 13/16, Fisher Street, London, W.C.1.

The Airplane and its Engine, by C. H. Chatfield, C. Fayette Taylor and Shatswell Ober. Price 18s., McGraw-Hill Publishing Co., Aldwych House, London, W.C.2.

The Picture Book of Aeroplanes. Ward Lock and Co., Ltd., Warwick House, Salisbury Square, London, E.C.4.

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